

Research Anthology on Concepts, Applications, and Challenges of FinTech



Information Resources Management Association

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Research Anthology on Concepts, Applications, and Challenges of FinTech

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Preface

Financial technology (FinTech) has emerged as one of the most promising technological innovations for financial professionals, and both the usage and impacts continue to be widespread. By introducing these new technologies, the face of banking and finance forever changed. Bringing on newfound benefits such as accessibility, financial inclusion, and quicker and more efficient processes made FinTech an intriguing advancement. The need for information on where and how FinTech is being used is vital to better improve its processes and to understand the workings of the technology itself and how it functions in society and industry. Along with the positive aspects of the technology, there are also challenges such as security and privacy issues along with ethics that must be looked at. Only by gaining this holistic understanding of the concepts, uses, and issues with FinTech can the technology be advanced to be more secure, effective, and ethical. By presenting the latest tools, technologies, and concepts, FinTech can continue to develop and grow for the benefit of business, industries, and individuals.

Thus, the *Research Anthology on Concepts, Applications, and Challenges of FinTech* seeks to fill the void for an all-encompassing and comprehensive reference book covering the latest and emerging research, concepts, and theories for developing and adopting FinTech systems. This one-volume reference collection of reprinted IGI Global book chapters and journal articles that have been handpicked by the editor and editorial team of this research anthology on this topic will support bankers, business managers, economists, financial analysts, FinTech companies, entrepreneurs, computer scientists, academicians, researchers, financial professionals, and students with an advanced understanding of critical issues and developments in the applications and usage of FinTech.

The *Research Anthology on Concepts, Applications, and Challenges of FinTech* is organized into four sections that provide comprehensive coverage of important topics. The sections are:

1. Evolution, Development, and Economic Impact of FinTech;
2. FinTech Companies, Financial Service Transformation, and Adoption of FinTech Into Current Business Models;
3. FinTech Security, Information Privacy, and Ethics;
4. Mobile Services, User Expectations, and Social Impact.

The following paragraphs provide a summary of what to expect from this invaluable reference tool.

Section 1, “Evolution, Development, and Economic Impact of FinTech,” opens this comprehensive reference work with research on the history and development of FinTech and the opportunities and challenges that have risen due to it. This book opens with the chapter “Financial Technologies: Concept, Application, and Challenges” by Profs. Mobashar Rehman, Debra Hooi Chern Lee, and Hui Nee Au Yong of Universiti Tunku Abdul Rahman, Malaysia and Prof. Manzoor Ahmed Hashmani of Universiti Teknologi PETRONAS, Malaysia, which explores the concept of Financial Technology (FinTech) and

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how it has progressed to where it is today. The next chapter, “FinTech: A Study of Enablers, Opportunities, and Challenges in the Banking and Financial Services Sector,” by Prof. Vibha Bhandari of the College of Applied Sciences Nizwa, Oman, studies the emerging trends associated emerging opportunities and challenges of FinTech in the banking and financial sector globally. The following chapter, “New Financial Technologies, Cryptocurrencies, Blockchain, and Challenges,” by Prof. Burcu Sakiz of Turkish Airlines, Turkey, contributes to the discussion on future avenues for sustainability and information systems research on FinTech’s, especially cryptocurrencies and blockchain-based platforms and services. The chapter “Risk Management in the Era of Blockchain: A Warning and Welcome for FinTech” by Prof. Mohammed Faisal Abu Khaled of Al-Imam Muhammad Ibn Saud Islamic University, Saudi Arabia documents the various ways that the nascent technology, blockchain, and other forms of distributed ledger technology (DLT) can provide both increased and decreased risk as well as offer FinTech industries a fertile environment to pursue key technological advancements. Next, “The Impact of FinTech on Economic Performance and Financial Stability in MENA Zone” by Profs. Souhaila Kammoun, Sahar Loukil, and Youssra Ben Romdhane Loukil of the University of Sfax, Tunisia deliberates on the effects of FinTech on economic performance in the context of political instability in MENA zone countries. The chapter “FinTech Strategies in the GCC: Developing a Growing FinTech Ecosystem – A GCC Perspective” by Prof. Konstantinos Tsanis of Hult International Business School, UAE analyzes the FinTech ecosystem development mode for all the GCC countries, focusing on understanding the reason that have made it one of the most successful FinTech ecosystems globally. Following is the chapter “FinTech in the Saudi Context: Implications for the Industry and Skills Development” by Prof. Faisal Abubotain of Ministry of Finance, Saudi Arabia and Prof. Petros Chamakiotis of ESCP Europe Business School, Spain, which unpacks how FinTech is developing in Saudi Arabia, considers the challenges and opportunities that FinTech may be facing in Saudi Arabia, and discusses how these changes may affect current bankers and how future bankers can be ready to enter the new market. The next chapter, “Paving the Way for the Development of FinTech Initiatives in ASEAN,” by Profs. Mahani Hamdan and Muhammad Anshari of the Universiti Brunei Darussalam, Brunei, provides an overview of FinTech and examines the development of FinTech initiatives to shed light on some challenges and solutions facing the ASEAN’s financial landscape today and in the future. This section concludes with “Financial Technology and Innovative Financial Inclusion” by Prof. Sumarsono of the Universitas Islam Negeri Sunan Kalijaga Yogyakarta, Indonesia; Prof. Abdullah Al-Mudimigh of Dar Al Uloom University, Saudi Arabia; and Prof. Muhammad Anshari of the Universiti Brunei Darussalam, Brunei, which focuses on the definition and the importance of FinTech to the financial ecosystem especially in the Southeast Asia region.

Section 2, “FinTech Companies, Financial Service Transformation, and Adoption of FinTech Into Current Business Models,” presents extensive coverage and case studies on the development of FinTech companies, how FinTech is transforming businesses, especially banks, and the adoption of FinTech systems into current models. This section begins with “Digitalisation of the Global FinTech Industry” by Prof. Usman Javed Butt of Brunel University, London, UK and Prof. Muhammad Waleed Butt of Coventry University, UK, which focuses on digital trends in the banking industry such as digitalization core processes, increasing awareness, financial inclusions, and undertaking sustainable practices. Next, “Digital Business Transformation in the Banking Sector” by Profs. José Campino, Ana Brochado, and Álvaro Rosa of ISCTE – Instituto Universitário de Lisboa, Portugal explores the impacts that FinTech’s have had on the traditional banking sector. The following chapter, “Adoption of Financial Technology in Islamic Crowd-Funding: Predicting Small and Medium-Sized Enterprises’ Intention to Use the Investment Account Platform,” by Profs. Maizaitulaidawati Md Husin and Shahab Aziz of the Universiti

Teknologi Malaysia, Malaysia and Prof. Razali Haron of the International Islamic University Malaysia, examines the factors that influence small and medium-sized enterprises' (SMEs) intentions to use the investment account platform (IAP) based on technology acceptance model (TAM). The chapter "Financial Technology Implications: Emerging Markets Context" by Profs. Arjun R., Nishmitha N., and Suprabha K. R. of the National Institute of Technology Karnataka, India examines the particularities of the financial technology industry and explores how FinTech is defined and how the financial technology solutions can be implemented by companies and categorized. Another chapter, "FinTech and SMEs: The Italian Case," by Prof. Mirjana Pejic-Bach of the University of Zagreb, Croatia and Profs. Sanja Seljan and Amir Topalovic of Consorzio per il Trasferimento Tecnologico C2T, Italy, presents a study about Italian SMEs and focuses on FinTech-aided banking services, in particular, the most widely used FinTech technologies available in Italy. The following chapter, "FinTech for Digital Financial Services: The African Case," by Prof. Benjamin Enahoro Assay of Delta State Polytechnic Ogwashi-Uku, Nigeria, examines the issues, controversy, and problems surrounding the debut of FinTech and suggest ways to make the technology acceptable in order to harness its potentials for the overall benefit of the African society. Next, "Fintech Ecosystem and Banking: The Case of Turkey" by Prof. Yakup Söylemez of Zonguldak Bulent Ecevit University, Turkey contributes to the literature in terms of the analysis of the relationship between banking and Fintech, which is based on the Turkish Fintech Ecosystem. The following chapter, "Regulating FinTech Businesses: The Malaysian Experience," by Prof. Sherin Binti Kunhibava of the University Malaya, Malaysia and Prof. Aishath Muneeza of the International Centre for Education in Islamic Finance (INCEIF), Malaysia, explains the steps taken by Malaysia's financial regulatory authorities in dealing with FinTech-based companies, critically review the regulations, and recommend some ways forward. This section ends with "Inclusive Disruption: The Role of Financial Technologies in Filling Financial Inclusion Gaps in Russia" by Profs. Oksana Smirnova, Vladimir Korovkin, and Evgeny Plaksenkov of Moscow School of Management SKOLKOVO, Russia, which discusses the important socioeconomic role of financial technologies in the emerging market which is Russia today through the study of five business cases.

Section 3, "FinTech Security, Information Privacy, and Ethics," reveals the latest research on security and privacy issues within the use of FinTech and the possible solutions to these challenges. The first chapter in this section, "Security and Privacy in FinTech: A Policy Enforcement Framework," by Profs. S. Iqbal, Muzammil Hussain, Sobia Mehrban, Muhammad Waqas Nadeem, Syeda Nisar Fatima, Owais Hakeem, and Ghulam Mustafa of the University of Management and Technology, Pakistan, provides a policy framework to ensure the security and privacy of user information in financial technology, since FinTech applications and services carry quite sensitive data of its users. The following chapter, "E-Banking Security: Threats, Challenges, Solutions, and Trends," by Profs. Fabio Diniz Rossi, Rumenuge Hohemberger, Marcos Paulo Konzen, and Daniel Chaves Temp of the Federal Institute of Education, Science, and Technology of Farroupilha, proposes reviewing the ways by which fraudulent activities are performed and what banks are doing to prevent such activities, as well as the new security measures that banks are using to increase customer confidence. The chapter "Ethics in Mobile Banking: A Case Study of Kenya's Mobile Money Platforms" by Prof. Rehema Kagendo Kiarie of Riara University, Kenya addresses the ethical issues relating to mobile money transfer in Kenya. Concluding this section is the chapter "Impact of Mobile Money on Financial Crime, Money Laundering, and Terrorism Financing" by Dr. Gilbert Ouko Oyoo, an Independent Researcher in Kenya, which posits that although mobile money has led to greater financial inclusion, the rate with which the myriad financial crimes have been reported over the past decade in the face of this phenomenon raises the need to stay abreast of developments in this space.

Preface

Section 4, “Mobile Services, User Expectations, and Social Impact,” concludes this reference work with a discussion the different types of FinTech services that can be applied to mobile devices, user expectations when using FinTech systems, and the impact that FinTech has had on society. The final section of this book starts with the chapter “Mobile Payment and Its Social Impact” by Prof. Ligu Yu of Indiana University South Bend, USA and Prof. Liping Sun of Harbin University of Science and Technology, China, which provides readers with a holistic view of one of the fastest-evolving financial activities that are transforming business, individuals, and the society. The next chapter, “Analysis of a Mobile Payment Scenario: Key Issues and Perspectives,” by Profs. Myriam Martínez-Fiestas and Francisco Montoro-Ríos of the University of Granada, Spain, evaluates the scenario in which mobile payments are currently inserted to offer those interested in developing research in this area a broader understanding of the mobile payment ecosystem and its evolution. The chapter “The Use of Technology Acceptance Model in Mobile Banking” by Prof. Kadriye Burcu Öngen Bilir of Uludag University, Turkey identifies and investigates the factors that influence the adoption of mobile banking, and specifically focuses on the evaluation of mobile banking application with users or non-users. The following chapter, “Intention to Use Mobile Commerce: Evidence From Emerging Economies,” by Prof. Nhung Bui of National Economics University, Hanoi, Vietnam; Profs. Long Pham, Stan Williamson, and Hanh Le of the University of Louisiana, Monroe, USA; and Prof. Cyrus Mohebbi of New York University, New York, USA, analyzes the factors affecting customers’ intention to use mobile commerce in Vietnam. Another chapter, “Mobile Financial Services in Developing Countries: The Impact on Consumer Financial Behaviour,” by Prof. Gordian Stanslaus Bwemelo of the College of Business Education, Tanzania, describes how mobile technologies have recently emerged as the new wave in the information technology revolution and are constantly gaining importance and popularity in nearly every avenue of our working and social lives. The chapter “Enablers and Inhibitors of Merchant Adoption of Mobile Payments: A Developing Country Perspective” by Profs. Eunice Yeboah Afeti and Joshua Ofori Amanfo of the University of Ghana, Ghana explores qualitatively through a case study the enablers and inhibitors to merchant adoption of mobile payments. Next, “A Comparative Study of Mobile Banking Adoption: An Analysis of Banking Customers in U.S. and Thailand” by Prof. Chuleeporn Changchit of Texas A&M University, Corpus Christi, USA and Profs. Jomjai Sampet and Ravi Lonkani of Chiang Mai University, Thailand compares the mobile banking perceptions between the consumers in the U.S. and in Thailand and reveal various factors that influence mobile banking adoption for these two nationalities. The following chapter, “Profiling Mobile Service Customers in the Spanish Market,” by Prof. Cristina Calvo-Porrall of the University of La Coruña, Spain, examines whether different user groups exist in the mobile services industry and profiles and characterizes them in order to provide management recommendations for mobile service companies. The chapter “Continuance Usage of Mobile Banking Services Among Small and Medium Enterprises (SMEs) in Tanzania” by Profs. Herman E. Mandari, Daniel Ntabagi Koloseni, and Julius Macha of The Institute of Finance Management, Dar es Salaam, Tanzania examines the intention to continue using mobile banking services among SMEs in Tanzania using ease-of-use, perceived trust, and attitude. One of the concluding chapters, “Financial Literacy for Financial Inclusion Using Mobile Technology in India,” by Profs. Smriti Ashish Pathak and Shreya Virani of Symbiosis International University, India, discusses financial literacy in India and how those services would benefit rural communities. This reference work concludes with “Mobile Wallets in India: A Framework for Consumer Adoption” by Profs. Nidhi Phutela and Shrirang Altekar of Symbiosis International (Deemed University), Pune, India, which discusses the adoption of mobile technology in developed countries and the factors that are influential to understand the reasons for such adoption.

Although the primary organization of the contents in this work is based on its four sections, offering a progression of coverage of the important concepts, methodologies, technologies, applications, social issues, and emerging trends, the reader can also identify specific contents by utilizing the extensive indexing system listed at the end. As a comprehensive collection of research on the latest findings related to security and privacy issues in mobile devices and applications, the *Research Anthology on Concepts, Applications, and Challenges of FinTech* provides bankers, business managers, economists, computer scientists, academicians, researchers, financial professionals, students, and all audiences with a complete understanding of how FinTech was developed, how the technology is advancing, and the industries and individuals its application has impacted. Given the rising use of technology, FinTech has become increasingly popular and used internationally, making it a critical exploration that this extensive book investigates and addresses with the most pertinent research on FinTech applications, concepts, and challenges.

Section 1

Evolution, Development, and Economic Impact of FinTech

Chapter 1

Financial Technologies: Concept, Application, and Challenges

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ABSTRACT

This chapter explores the concept of Financial Technology (FinTech) and how it has progressed to where it is today. This understanding is further supplemented with the applications of FinTech and the challenges it has to tackle in order to continue to evolve in a favourable manner. Being a key player in the FinTech sector, this chapter also delves into the concept of blockchain technology (BCT) to comprehend how it holds the power to impact society through revolutionary applications. As the world heralds an era of FinTech, this chapter aims to give insights on the potential of FinTech and how it cross borders to change the lives of many.

THE CONCEPT OF FINTECH

Based on Google Trends (2018), the search term ‘FinTech’ has grown worldwide by more than 5000% over the past five years, gaining it the status of a ‘Breakout’ query. FinTech, which denotes ‘Financial Technology’, is the intertwinement between technological innovation and finance in which it improves the delivery of financial and banking services through the application of Information Technology (IT)

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(Gai, Qiu, & Sun, 2018; Ozili, 2018). In other words, FinTech is an industry consisting of companies that make financial systems and the delivery of financial services more efficient through the use of technology (CB Insights, 2015).

The growing interest in FinTech is not surprising as not only is it shifting paradigms in many areas of the finance industry, but it is also transforming everyday lives as a third of consumers worldwide use FinTech services regularly, with 84% of them aware of their use of FinTech (Ernest & Young FinTech Global Network, 2017). Examples of FinTech application in everyday life include easy payment services such as Paypal, mobile payment services like Apple Pay or simply purchasing items online via credit card.

With this, it is clear that FinTech is no longer a hype but has become a major gamechanger in the field of finance, with 83% of financial firms believing that FinTech start-ups are posing a threat to various aspects of their business (PwC, 2016). This leads to an inevitable need in financial institutions to re-evaluate their existing business models and embrace FinTech in order to remain relevant in this field while gaining a competitive edge (Lee & Shin, 2018) as the emergence of cloud computing, open software, easier access to computing power and data servers mean that even small, innovative technology start-ups can quickly turn their ideas into marketable products.

The global FinTech sector continues to thrive as it raised \$41.7 billion in investments during first half of 2018, which surpasses the record total for the whole of 2017 (FinTech Global, 2018). Investments in FinTech are in an all-time high compared to previous years as it was reported that global investment in FinTech companies totaled \$19.1 billion in 2015, and it was \$13.8 billion in the United States alone (Ancrì, 2016).

Much like how the saying goes ‘if you can’t beat them, join them’, much of this growth in investment comes from traditional financial institutions investing in external FinTech start-ups in the form of joint ventures as well as from their own internal FinTech projects (Lee & Shin, 2018). The banks have clients and scale but the new FinTech entrants usually have the innovation edge, especially at the “client experience” interface.

This continuous growth in investment is leapfrogging the development of FinTech to lead breakthroughs in domains such as trust management, big data, cloud computing and data analytic techniques (Gai et al., 2018). More importantly, these ventures contribute to the innovations that lie at the crux of FinTech such as cryptocurrencies and the blockchain, new digital advisory and trading systems, artificial intelligence and equity crowdfunding (Larios-Hernández, 2017). There is a positive feedback cyclic nature to this as this wave of innovations further accelerate the growth of existing financial institutions and attract new affluent investors, which enables more research and development in FinTech (Nakashima, 2018).

The rise of the technology-savvy and connected generation of investors has necessitated innovative investment solutions which offer greater convenience, channel access, transparency and lower cost. The importance of digital technology is in democratising finance. FinTechs are offering technology-enabled solutions that enhance accessibility, convenience and tailored products.

Evidently, FinTech is not just revolutionary to financial institutions and business operators, but it is also causing a big stir in the mundaneness of life. In fact, FinTech has been likened to the Internet of Things (IoT), which is said to be the fourth industrial revolution as FinTech is disrupting existing industry structures and blurring the frontiers of industries (Nakashima, 2018; Philippon, 2016). Some of the notable digital disruptors are the blockchain technology, dark pools and high frequency trading (HFT), robo-advisors (Preetha, 2015).

According to EY’s Banking in Emerging Markets GCC FinTech Play 2017 report, the risk of FinTech disruption for both Islamic and traditional financial institutions across emerging markets is real, with

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the Finance function of banks at the centre of the disruption (Noordin, 2017). Successful digital money solutions should: 1) meet the needs of the market by filling a critical gap; 2) address muscle memory in users, becoming second nature to them and hitting the all-important tipping point for adoption; and 3) confront structural challenges to keep users away from the temptation of paper money (Citigroup, 2016a). Collaboration among FinTechs and traditional financial institutions especially in digital payments, money transfer and lending are now becoming the norm.

In Southeast Asia, the disruption is more pronounced in ‘payments’, with relatively less FinTechs in capital markets and wealth management. FinTechs are making a push in social payments and remittances in retail, and targeting the payables and receivables flows in SME banking (Financial Planning Standards Board, 2016). FinTech for Financial Inclusion has to be transformative. For an economy to embrace the FinTech, technology enablers needed i.e. very online population, rising internet penetration, modest smartphone penetration and low cash dependence relative to GDP per capita (Citigroup, 2018). FinTechs concentrate efforts on storing relevant experience on technological innovations include the unbanked, close the gender gap of financial inclusion, help us manage climate change risks, mitigate the challenges of de-risking, and bring down the costs of cross-border remittances (Hannig, (2017).

FinTech given its significant potential to disrupt the business model and appeal to a wider audience by promising user-friendly services. FinTech is disrupting the financial services industry, forcing banks to clarify their digital strategies, develop new capabilities and transform their cultures. It helps companies further refine the customer experience and expand their e-banking and online solutions. The FinTech disrupters will force existing banks to accept lower margins, cut costs and improve the quality of financial services. The dramatic changes in financial services can be said to be driven by technology innovation, intensified regulations, changes in consumer behaviour and the need for cost reduction, this global trend is expected to continue in the future. FinTech innovations are transforming financial services in terms of consumer experience, efficiency, credit risks, compliance risks, operational risks and data (Ancrì, 2016). Change makes it more difficult for authorities to monitor and respond to risks in the financial system. Hence, there is an imperative need for transformative FinTech (Hannig, 2017).

These digital disruptions can be attributed to the dynamics of the FinTech ecosystem, in which it encompasses five key elements: FinTech start-ups, technology developers, the government, financial customers and traditional financial institutions (Lee & Shin, 2018).

First, FinTech start-ups lie at the very center of the ecosystem as they drive major FinTech phenomena such as the unbundling of financial services, which is a glaring disruption in the finance industry (Lee & Shin, 2018). Due to the unbundling of financial services, there are nine categories of FinTech start-ups: financing, payment, asset management, insurance (insurtech), loyalty programs, risk management, exchanges, regulatory technology (regtech) while the rest will be categorised as others (Haddad & Hornuf, 2016).

Since consumers now have the power to pick and choose individual finance services from a range of different FinTech providers, traditional financial institutions are at a disadvantage as consumers no longer have to rely on a single financial institution to manage their finances (Lee & Shin, 2018). For instance, a consumer may use PayPal for payments while choosing Kabbage for loans and making investments through Betterment.

Technology developers play a role in FinTech’s ecosystem as they create a conducive environment that facilitates the growth of FinTech start-ups through platforms such as social media, big data analytics, cloud computing, artificial intelligence, smartphones and mobile services. In return, the FinTech sector helps these technology developers gain revenue (Lee & Shin, 2018).

Governments provide a regulatory environment for FinTech as economic policies, national economic development plans and regulation levels affect FinTech service provisions. Looser regulatory requirements are in favour of FinTech expansion as this enables FinTech start-ups to provide more accessible, customised and cost-effective financial services as compared to traditional institutions (Lee & Shin, 2018). On the other hand, FinTech benefits the government through the generation of a higher tax revenue by encouraging an increase in aggregate expenditure and in the volume of financial transactions (Ozili, 2018). Lastly, traditional financial institutions is a vital component in the FinTech ecosystem as their strength in economies of scale and financial resources enables them to provide funding to FinTech start-ups in exchange for gaining insights of FinTech applications in order to gain resilience in this competitive industry (Yang, 2015).

Financial customers are not only the source of revenue for FinTech companies, but they are also the muse for FinTech development (Lee & Shin, 2018; Nakashima, 2018). Although large organisations play a big role in generating revenue, individual customers and small and medium-sized enterprises (SMEs) are actually the predominant revenue source for FinTech start-ups. Due to the tech-savviness of the younger generation, millennials (individuals of age between 18 and 34) are the primary contributors to FinTech consumption, especially those with higher income (Lee & Shin, 2018). However, there is an undeniable disparity in accessibility to FinTech and this continues to inspire FinTech providers to improve the inclusion of digital financing (Ozili, 2018).

Hence, it can be noted that these five elements symbiotically play a part to ensure that the evolution of FinTech will continue to be one that improves the way people live by offering greater happiness or satisfaction in their lives (Lee & Shin, 2018; Nakashima, 2018).

THE EVOLUTION OF FINTECH

Although FinTech may seem like a relatively new innovation, this marriage between finance and technology actually has a long history that goes all the way back to the late 19th century. Over the span of the past 150 years, FinTech has evolved over three main eras and is currently still under much development (Arner, Barberis & Buckley, 2015).

From a historical perspective, finance and technology have been in a mutualistic relationship since their earliest stage of development. An example that illustrates this the written records of financial transactions during the Mesopotamian civilisation, as written records is one of the earliest form of information (Arner et al., 2015).

However, it was the advances in telegraph technology around the year 1866 that led to the birth of Victorian Internet which kickstarted the first wave of FinTech, also known as FinTech 1.0. The Victorian Internet connected western Europe to North America, thus enabling the instantaneous transmission of financial information between the major financial markets of London and New York. This revolution in business practices in addition to technological improvements such as in railroads and steamships led to the first age of financial and economic globalisation that marked FinTech 1.0 (Arner et al., 2015; Khan, 2018).

Although this era was heavily interlinked with technology, it remained largely an analogue industry that focused on infrastructure through the laying of transatlantic telegraph cables (Arner et al., 2015). After the post-World War I recession, the latter part of FinTech 1.0 began to focus on computerisation as great lengths were taken to develop codes and code breakers in order to secure military communica-

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tion (Khan, 2018). These efforts proved to be fruitful as they led to FinTech's first major milestone – the opening of the world's first Automated Teller Machine (ATM) by Barclays in 1967 (Raza, 2018). This, along with the establishment of a global telegraph exchange network and the pioneering invention of the first handheld financial calculator, helped propel FinTech into its second era – FinTech 2.0 (Arner et al., 2015).

The commencement of FinTech 2.0 in 1967 marked a shift in financial services as they moved from an analogue industry to a digital one. For instance, the telegraphic system set in place during FinTech 1.0 became electronic in the 1970s while financial firms progressively replaced most forms of paper-based mechanisms with FinTech innovations such as Bloomberg terminals by the 1980s (Arner et al., 2015).

Highlights of the second phase of FinTech include the establishment of the world's first digital stock exchange – NASDAQ, in 1971. This holds much significance as it shaped the electronic trading to the one we know today.

Another milestone of FinTech during this period is the launch of the Society of Worldwide Interbank Financial Telecommunications (SWIFT) in 1973. The SWIFT system is the first and still the most commonly used global payment systems to this very day as it provides the communication protocol between financial institutions, thus enabling large volumes of international payments among them (Khan, 2018).

That being said, the real turning point for FinTech 2.0 was in the 1990s due to the internet revolution. This began in 1995, where online account checking was first made available via the World Wide Web (WWW). Shortly after that, e-commerce business models started to emerge and were made possible through the founding of Paypal in 1998, which addressed the issue of online payment processing (Arbor Ventures, 2018). The combined impact of these developments made the internet and digitalisation the two key elements of FinTech 2.0, with electronic finance (e-finance) being the star of this age (Arner et al., 2015; Lee & Shin, 2018).

The second era of FinTech was brought to an abrupt end in 2008 due to the global financial earthquake that left the world financial system on the brink of collapse. In actuality, the 2008 global financial crisis was a blessing in disguise for FinTech as it helped elevate this sector to unprecedented levels (Haddad & Hornuf, 2016).

As the public had a growing distrust towards formal financial institutions after the crisis, new entrants such as FinTech start-ups were able to successfully penetrate the world of finance (Arner et al., 2015). Since FinTech start-ups had a relatively clean track record in that point of time, they could take advantage of the public's lack of confidence in traditional financial institutions to bloom in spite of the fragile state of the finance industry (Lee & Shin, 2018).

Not to mention, FinTech start-ups had a leverage at that time as they were unencumbered by the stricter financial regulatory reformations imposed on traditional banks after the crisis (Santander InnoVentures & Oliver Wyman, 2015). In an attempt to prevent the 2008 financial crisis from reoccurring, new stringent regulatory compliances were set in place while existing ones were accelerated. This resulted in the reduced profitability of traditional financial firms, which encouraged them to massively invest in IT in order to address these changes (Khan, 2018).

The third factor leading to the sudden upsurge of FinTech start-ups is the downsizing of IT teams as well as back office employees in companies that were badly affected by the 2008 financial crisis in efforts to reduce operational costs (Arner et al., 2015). This massive job loss ushered a new age of FinTech start-ups as many of these highly skilled but unemployed people began to look for new opportunities and found a demand in the area of crowdlending and crowdfunding, which is one of the prominent FinTech services today (Haddad & Hornuf, 2016). This demand arose as a consequence of the financial crisis

as there was an increased cost of debt for many small firms and in some cases, banks stopped lending money to businesses. Hence, these firms were under much pressure due to credit lines or bank loan rejections and had to resort to equity crowdfunding as an alternative source of external finance (Schindele & Szczesny, 2016; Lopez-de-Silanes et al., 2015).

Of course, the skyrocketing popularity of smartphones led by the launch of the Apple iPhone back in 2007 also greatly facilitated the accelerated growth of FinTech as their ubiquity was perfect for FinTech start-ups to provide direct point-of-sales (POS) and stored value systems to individuals (Arner et al., 2015; Khan, 2018; Rooney, 2018).

As a result, FinTech 2.0 was very much driven by FinTech start-ups, with little participation from conventional banks. It is also notable that while these initial innovations brought substantial attention and revenue to the FinTech sector, the financial solutions provided by these start-ups were relatively simple and were largely limited to improving transactions that already existed. Nonetheless, these four factors set the stage for the third phase of FinTech – FinTech 3.0, which is also its current era (Arbor Ventures, 2018).

FinTech 3.0 is very much different from its previous eras as it is not only aimed at improving the efficiency of pre-existing financial services, but it also has ambitions in redefining these services while innovating new solutions. Armed with artificial intelligence, greater computing power and an increased participation from large financial institutions, FinTech 3.0 brings a new horizon to the financial world as it introduces us to revolutionary inventions such as the blockchain technology and cryptocurrencies, which may lead to the obsolescence of traditional fiat currencies (Arbor Ventures, 2018; Khan, 2018).

A major FinTech milestone in this era is the invention of the world's first and largest cryptocurrency – Bitcoin (BTC) by Satoshi Nakamoto in 2009. This digital token took the world by a storm as the value of 1 BTC climbed from a meagre 8 cents in July 2010 to nearly a staggering \$20,000 in December 2017, making it a gold rush amongst investors and traders in this digital age (Kharpal, 2018).

More importantly, the creation of Bitcoin also birthed the concept of blockchain technology as Nakamoto invented blockchain as a core component of Bitcoin, where blockchain serves as a public transaction ledger for the digital token. This holds much significance as blockchain represents the first fully functional distributed ledger technology (DLT) in which it utilises a peer-to-peer network that eliminates the need for a trusted party to facilitate digital relationships such as cryptocurrency transactions (Nakamoto, 2008). With this innovation in information registration and distribution, the third stage of FinTech 3.0 has seen changes in traditional banks as 69% of them experimenting with private blockchains (EdgeVerve Systems, 2017).

In fact, many countries are becoming more crypto-friendly. One of such countries is Singapore, where the Monetary Authority of Singapore (MAS) announced “Project Ubin” in 2016 as an attempt to explore blockchain as the country shows interest in launching its own digital currency (Kharpal, 2017). Additionally, the highly regarded Ngee Ann Polytechnic in Singapore is already using blockchain to verify the authenticity of the public institute's diplomas, proving that FinTech is impacting countries in immeasurable ways (Lago, 2018).

FinTech 3.0 also encompasses FinTech 3.5, which emphasises on financial inclusion and economic development in developing countries, especially in Africa and Asia (Arner et al., 2015). A good example would be the meteoric rise of FinTech in China, where their financial system used to be described as nothing short of underdeveloped but has since transitioned into a cutting-edge institutional system due to the expansion of FinTech implementations such as mobile payments via Alipay (Shim & Shin, 2016).

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Evidently, FinTech is always evolving as it is driven by weaknesses in the financial landscape, market demands, regulation policies and availability of technological resources (Haddad & Hornuf, 2016). In any case, it is important to realise that every evolution brings opportunities and risks that must be carefully considered in order to support market developments while abiding core mandates such as systemic stability, consumer protection and market competition (Arner et al., 2015).

COMPARISON WITH FIAT MONEY

Before delving into the frills and thrills of currencies such as fiat currency or cryptocurrency, it is important to understand how and why money lies at the core of economics (Paulsen, 2012).

From a technological point of view, money is simply a record-keeping device in which it provides a (possibly limited) form of societal memory of transactions (Kocherlakota, 1998). This gives money three standard roles in an economy:

1. A store of value
2. A medium of exchange
3. A unit of account

Hence, virtually anything can be considered as money as long as it fulfils these three major functions (Quickonomics, 2016).

Currently, fiat money the most dominant form of money in the economic market. It can be defined as any legal tender issued by the government and controlled by a central authority such as the central bank (Goyal, 2018; Quickonomics, 2016). This is precisely what makes it so prevalent – the government order behind its designation regulates it and makes it a requirement for all people and organisations within the country to accept it as a means of payment. Its widespread acceptance is also attributed to the people's trust in the central authority as its value is guaranteed by its issuer (Rotman, 2014). A traditional example of this form of currency is the paper bills of the US Dollar while electronic examples of it include bank credit.

The truth is, fiat money itself is intrinsically useless (Kocherlakota, 1998; Paulsen, 2012). Instead, its value is derived from the relationship of supply and demand as well as the public's confidence in the issuing government. However, this serves as a double-edged sword as it puts this form of money at risk of inflation and deflation (Investopedia, 2015; Quickonomics, 2016).

It is beyond the shadow of doubt that monetary economics is often associated with inflation in which how the quantity of money or its growth rate will affect the prices and quantities of goods. However, this view of money has been challenged with the idea that this focus is misplaced. Since money is essentially a record-keeping device as aforementioned, the true focal point should be on making sure that the record-keeping of financial transactions is done in the most efficient way possible (Kocherlakota, 1998).

This brings us to cryptocurrency, which is a type of unregulated, digital money that is issued and usually controlled by its developers, which means that it is not backed by a central government nor a bank (Rotman, 2014). As of March 2018, there are over 1600 cryptocurrencies in existence, with Bitcoin, Ethereum and Ripple being some of the more prominent examples (Frankel, 2018).

Much like fiat money, cryptocurrency also does not have any intrinsic value (Rahman, 2018; Rotman, 2014). However, cryptocurrency is less prone to inflation because it cannot be infinitely printed to

create more supply. Rather, most of them were designed to be capped at a certain number. For example, only 21 million BTC will ever exist based on a predetermined algorithm, where the last BTC will only be mined in the year 2140. This is also the reason why it is possible to determine the number of digital coins circulating at any particular point in time whereas this cannot be done for fiat money (Goyal, 2018).

Unfortunately, many people seem to confuse the price volatility of cryptocurrency with inflation. While political and economic stability have a major impact on fiat money, it is actually technology, adoption rate and demand that heavily influences the value of digital coins (CryptoFarmer, 2018). However, it is undeniable that this high volatility of cryptocurrency is its biggest drawback as it labels cryptocurrency as an abstract concept that is harder to understand and contend with, which drives potential users away due to fear, mistrust and misunderstandings (Goyal, 2018).

Just from their definitions alone, it is clear that there are many other pronounced differences between fiat currency and cryptocurrency. Other than the aspect of legality, these two forms of money also have obvious distinctions when it comes to tangibility as cryptocurrencies do not physically exist, unlike fiat money. As such, cryptocurrencies have the advantage of portability and transferability as there is no physical weight to them (Chizurum, 2018).

The intangible nature of cryptocurrencies gives rise to dissimilarities in terms of storage and exchange, where it can only be stored in digital wallets and exchanged digitally. In contrast, fiat money has the advantage of versatility as it can be stored and exchanged physically as hard cash or digitally through payment providers such as Paypal or even in conventional banks (Goyal, 2018). Another notable gulf is that exchanges done via cryptocurrency is irrevocable as there is no way to cancel transactions made using it – the recipient has to start another transaction to send the digital coins back to the sender. While this may be cumbersome for some, it ensures that cryptocurrencies provide a secure medium (Rotman, 2014).

An important point to note is that cryptocurrency is based on a decentralised system whereas fiat money lies on a centralised system. Unlike how the government and central bank controls fiat currency, cryptocurrency does not have a single entity that controls it. Every device that mines cryptocurrency and makes transactions through it makes up part of the network, which eliminates the need for intermediaries such as banks or payment processors. As such, cheaper transfer fees and faster confirmation times can be achieved with cryptocurrency (Zainuddin, n.d.).

Another glaring difference between cryptocurrency and fiat money is the issue of privacy. Customers may remain anonymous when making transactions via digital coins as no one can view the amount nor location of the digital wallet (Rotman, 2014). With fiat money, the government and bank has access to an individual's financial information as much of their fiat money is stored in banks. Alas, this makes cryptocurrency the perfect tool for criminals as they can avoid detection and identification since transactions made with digital coins cannot be traced easily (Chizurum, 2018).

However, the key point is that cryptocurrency is a better record-keeper of financial transactions due to its underlying blockchain technology. At its core, cryptocurrency is nothing but a digital file that records every transaction that took place in its network in an open ledger called the "blockchain" (Rotman, 2014). This makes cryptocurrency more transparent as compared to fiat currency. While this may seem contradictory as the users' identities are concealed, transparency and privacy can coexist through the blockchain technology as each user is given a public address where other people may view the holdings and transactions that he or she carried out, which reduces the risk of fraud. This public address is created through a combination of several cryptographic operations that prevents identification of the person behind it (Lisk Academy, n.d.; Yap, 2017).

Ultimately, both fiat money and cryptocurrency have their own strengths and weaknesses. Nevertheless, with the advent of problems pertaining to fiat money such as hyperinflation, kleptocracy and fraudulent crimes, cryptocurrency might be the answer to many of these issues as it creates a trustless system, where trust is not even needed as it is immutable and incorruptible (Lisk Academy, n.d.).

INDUSTRIES AND APPLICATIONS WHERE FINTECH IS AND WILL BE SUITABLE

Finance Industry

As its name implies, FinTech is the perfect catalyst for the revolution across the whole finance industry, no matter if it's a bank, insurance firm, brokerage company or saving and loan associations. This is possible with the rise of FinTech's ingenious innovation – intelligent automation, which could help the finance sector gain up to \$512 billion in new global revenue by the year 2020 (Middleton, 2018).

According to the report “Growth in the Machine” by Capgemini’s Digital Transformation Institute (2018), intelligent automation is the right combination of robotic processing automation (RPA), artificial intelligence (AI) and business optimisation processes. This FinTech is a powerful driver of revenue as not only can it cut operating costs while improving customer satisfaction, retention and loyalty but it also enables targeted marketing, extended business hours and a competitive leverage.

The launch of OCBC Bank’s specialised mortgage chatbot application “Emma” in 2017 is a solid testimony of how intelligent automation can be a hidden ace in a financial institute (Lee, 2017; Tay, 2018). The chatbot made headlines as it helped the bank generate over \$100 million of revenue since its debut, with 90% of the customers satisfied with their interaction and this percentage is expected to rise as Emma continues to undergo further training to ensure the best customer experience (Capgemini, 2018).

As explored previously, FinTech is responsible for numeral disruptions in the finance industry, especially due the unbundling of financial services. One of the financial services that is undergoing much digital reimagination is payment services due to the introduction of cashless payment solutions via cryptocurrency, mobile payment (m-payment) as well as innovative “backend as a service” (BaaS) payment processing models.

For instance, mobile devices such as smartphones can now act as wallets thanks to the development of m-payment services which can be utilised in a plethora of ways from performing electronic transactions such as paying bills to purchasing physical products such as through vending machines, ticketing machines or any manned point-of-sale (POS) systems (Iman, 2018).

Referring to Table 1, digital-banking penetration for transactions and services is on the rise across both developed and emerging countries (Härle et al., 2015). Among emerging Asian countries, China ranked the top, followed by Vietnam and Malaysia.

As payments represent the platform for the entire banking relationship, even nonbank players such as telcos, local payment specialists and global players are keen to capture payment revenue. Players such Alibaba in China, Globe in Philippines and PayPal across Asia Pacific are already gaining traction. The biggest payment company in Asia today is not a bank; it's Alipay (DBS Group Research, 2015). The payments technology has also created opportunities. Innovative solutions such as payments with a single tap or near-field communications, face/voice recognition and fingerprint verification are designed to support more secure and convenient payments. According to Viknesh and Abdulwahab (2017), customer

Table 1. Percentage of respondents using online banking 2014

Developed Asia	Percentage	Emerging Asia	Percentage
Australia	96	China	57
Hong Kong	93	India	18
Japan	83	Indonesia	36
Korea	96	Malaysia	41
Singapore	94	Philippines	13
Taiwan	92	Thailand	19
		Vietnam	44

Source: McKinsey survey on personal financial services in Asia, 2007-14 as quoted by Härle et al. (2015)

experience is affected by perceived ease of use, security and privacy, attitude, knowledge to use, digital efficacy, government support and perceived behavioural control (Viknesh & Abdulwahab, 2017).

It is worth noting that the year 2015 is a key milestone of electronic payment as the number of Interbank GIRO transactions (149 million transactions) surpassed the number of cheques cleared (148 million cheques) for the first time (Ibrahim, 2016). The Sun Daily reported that Bank Negara Malaysia (BNM) established a Financial Technology Enabler Group (FTEG) to formulate and enhance regulatory policies to facilitate the adoption of technological innovations, and would serve as the dedicated contact point for FinTech related queries. (“Banks willing to work with FinTech companies”, 6 June 2016). The financial services industry is capital intensive, involves larger amounts of money, control of credits and other risks, and highly regulated. Legal frameworks and business processes designed to protect consumers have to fully keep up to the changes in the digital landscapes.

Even though FinTech companies pose a threat to the financial institutions, it also presents an opportunity to collaborate with the startups. Malaysian banks that are not ready will experience negative consequences on their bottom line and profitability (Nazri & Hoolash, 2017). Among the local financial institutions, the speed of FinTech adoption defers from one with another. The four local banks that are leading the charge in digital finance are Maybank, CIMB, RHB Bank and Hong Leong Bank. Maybank launched MaybankFintech, the first by a bank in Southeast Asia in 2015, and digital services including Malaysia’s first mobile wallet, MaybankPay and Samsung Pay in 2016 (Maybank, 2017). CIMB Bank launched the CIMB FinTech to drive innovation as well as to incubate new ideas; digitise operations; and transform the Group (CIMB, 2017). RHB expects that significant innovation to come in areas such as lending, payments, wealth management and customer engagement. Secondly, RHB has also started its FinTech accelerator program. Thirdly, RHB have established a dedicated ‘Digital Center of Excellence’, as reported in The Sun Daily (“Banks willing to work with FinTech companies”, 6 June 2016.). RHB Bank collaborated with Startup bootcamp FinTech, and launched RHB Pay Anyone and RHB TradeSmart Global Trading System in 2016 (RHB, 2016). Hong Leong Bank launched HLB LaunchPad, a mentorship and developmental program targeted at nurturing technology start-ups, piloted in-branch mobile servicing solution and introduced eFD via FPX in 2017 (HLBB, 2017), and its FinTech development plans are in areas such as Peer-to-Peer (“P2P”) lending, e-wallet and e-payment providers, supply chain financing and providers of new credit scoring technologies (HLBB, 2018). These banks adopt the FinTech towards better mobile banking, cash management and understanding customer behaviour for higher productivity.

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Referring to Table 2, Malaysia was ranked 22nd, which was a drop of 2 ranks from year 2014; Malaysia still need to improve on especially on digital money solutions, propensity to adopt and technology and financial infrastructure.

Table 2. Digital Money Index 2016 (selected countries)

Rank	Country	Change in rank from 2014	Government and market support	Technology and Financial Infrastructure	Digital Money Solutions	Propensity to adopt
2	Singapore	0	1	3	7	8
3	United States	0	4	12	6	1
5	Hong Kong	0	3	1	20	12
9	Japan	0	5	18	8	4
21	Korea, Republic of	0	25	50	5	14
22	Malaysia	-2	10	20	27	23
37	Indonesia	0	41	45	51	34
38	China	1	27	63	41	46
40	Thailand	3	43	35	60	37
45	Philippines	-3	61	32	62	35
63	India	-9	57	37	49	74

Source: Citigroup (2016a)

Transportation Industry

With the ubiquity of mobile devices and the convenience that comes with it, it's not surprising that m-payment services are penetrating many daily activities, be it dining or shopping. In 2016, approximately 68 percent of China's population were users of m-payment, leading up to an astronomical total of \$760 billion in m-payment transactions (Wang et al., 2017). Technological advances have also encouraged the proliferation of m-payment systems as consumers can now perform transactions through short message service (SMS), near-field communication (NFC) and quick response (QR) codes (de Luna, Liébanacabanillas, Sánchez-Fernández, & Muñoz-Leiva, 2018).

These m-payment systems are shaking up the transportation industry, more specifically the public transportation sector as its adoption in this sector is useful for ticket purchasing and validation (Fontes et al., 2017). In China, Alipay is already a popular payment option for bus and subway passengers in over 50 cities, including Beijing, Shanghai and Hangzhou. Since this m-payment service uses an offline QR code-based payments that only require 0.3 seconds to complete, it is no wonder that this FinTech is ideally suited for hustle and bustle of public transport stations as it helps shorten queues and eliminates the need for small change (Finextra, 2018). This method of payment proves to be successful as Alipay has aggressive and ambitious plans to expand to around 50 new cities by 2019 in order to top competitors such as Tencent who are also players aiming to dominate this competitive field (Chen, 2018).

Gaming Industry

Cryptocurrency is changing the gaming industry radically as a blockchain-driven game economy is beginning to take shape, especially with the development of Ethereum games. Released in November 2017 by Axiom Zen, CryptoKitties is one of the first blockchain-based games where players collect and breed unique virtual cats and then auction their virtual cats for cryptocurrency. The game is definitely one to look out for as in September 2018, a CryptoKitty was sold for 600 ETH (Ethereum), which is equivalent to a shocking \$172,000 (Serrels, 2018). This proves that a cryptocurrency marketplace for gamers is feasible as it is every gamer's dream to be able to earn "real" money from playing games (Egovora, 2018).

There are also games where the cryptocurrency is used as their in-game payment currency. With the newfound partnership between AppCoins, a digital coin that is spearheading the use of cryptocurrency in the applications economy and Unity, a major game engine, game developers can now explore a new stream of revenue as gamers can now make in-game purchases using digital currency. There are high hopes that this venture will be successful as the quantity of payments using AppCoins has risen by 590 percent between September and October 2018 as its service is compatible with popular gaming platforms such as the Nintendo Switch and the PlayStation 4 in addition to iOS and Android mobile devices (Blenkinsop, 2018).

Eco-Industrial Development

FinTech proves itself to be multifaceted as it can also be implemented in the benefit distribution in payments for ecosystem services (PES) as well as REDD+, which is a global initiative that gives land users some financial incentives to reduce carbon and methane emissions from their land. Traditionally, payments from the scheme implementors (typically a government agency or a non-governmental organisation) would have to bypass lower-tiers of governments before accruing at the community level. Only then can the community representatives disburse the payment participating households or individuals.

FinTech brings a new approach to the PES/REDD+ benefit distribution as the participants in the PES/REDD+ schemes only need to register a mobile money account with the scheme implementors, thus skipping many links in the chain and reducing the associated risk of corruption and elite capture while enabling payments to be made in a more secure, instantaneous and effortless manner (Thompson, 2017).

This type of payment is also known as the government-to-peer (G2P) payment service offered through FinTech, which is salient in expanding financial inclusion especially in developing countries. This is why there are at least 19 G2P programmes operating in developing countries such as Pakistan (Arner, Buckley, & Zetzsche, 2018).

Hence, FinTech continues to astound us as it penetrates other industries and blooms steadfastly through the digital disruptions it creates. Unbeknownst to many, FinTech has truly begun to affect even the most inconspicuous parts of our daily lives due to its ubiquity, adaptability and versatility.

CHALLENGES WHICH FINTECH IS FACING AT THE MOMENT AND IN THE FUTURE

It is unavoidable that FinTech has to face formidable hurdles as it is crucial to ensure that the sector continues to improve as it evolves. Currently, the challenges FinTech face can be categorised into six major

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dimensions – financial inclusion, regulation, security and privacy, technology integration, shortage of skilled human resources and lastly, customer management (Lee & Shin, 2018; Ozili, 2018).

Financial Inclusion

To date, FinTech still struggles in expanding financial inclusion due to a variety of reasons. One of such reasons is the religious beliefs of certain communities towards technological developments (Ozili, 2018). For instance, Bitcoin was embroiled in a controversy amongst Islamic scholars as some regarded Bitcoin as halal while the others thought of it as something forbidden as it is an enabler for crimes such as tax evasion (The New Arab, 2018). Understandably, its questionable permissibility led to Bitcoin's weak foothold in the Muslim community and financial firms, which highlights a weakness in the financial inclusion of FinTech innovations such as cryptocurrency. When Muhammad Abu-Baker of Indonesia's Blossom Firm declared Bitcoin as compliant under Syariah Law in his research paper published in April 2018, the digital coin's value skyrocketed by over \$1,000 in just less than one hour as it was now potentially open to a new market of 1.6 billion Muslims (Cuthbertson, 2018). This may be an indication of just how much influence financial inclusion has on FinTech products.

Another challenge FinTech has to deal with as it strives for greater financial inclusion is financial illiteracy especially in rural and poor communities due to difficulties in attaining a holistic education. This is an onerous problem as individuals from such communities often do not trust in efforts taken to persuade them to adopt digital finance services in addition to the fact that they see little incentives to use digital channels which they do not or cannot understand. There is hope to rise above this obstacle as people in aboriginal or impoverished communities have a higher likelihood of trusting friends or family members who are already FinTech users, which provides some insight on the approaches FinTech can take to connect with them (Ozili, 2018).

Regulation

Regulation of FinTech remains to be a heavy pressure on FinTech start-ups as intuitions are required to produce escalating amounts of financial, risk and compliance data while being simultaneously regulated in multiple jurisdictions with multiple framework (Treleaven, 2015). Not to mention, FinTech start-ups have to also consider the balance between low cost business models and the compliance costs they come with (Arner, n.d.).

While this increased intrusion of regulation enables the systemic risk analysis of the FinTech and finance industry, it comes at a price as now FinTech firms are burdened with stringent regulatory compliances. This is a major barrier that discourages the innovation of new FinTech products, which highlights the need for regulatory support for innovation in this sector (Treleaven, 2015).

This situation is made worse when many emergent FinTech firms have difficulty in identifying their regulatory obligations due to its complexity, which can result in licensing delays and hefty fines (Arner, n.d.; Rampton, 2017). An incident demonstrating this occurred when the Financial Crimes Enforcement Network (FinCEN) levied its first fine on virtual currency exchange back in the year 2015, in which Ripple Labs was fined \$700,000 due to the firm's failure to register under FinCEN as well as failing to implement and maintain an adequate anti-money laundering (AML) program (Ferro, 2015).

FinTech start-ups can also be seen to operate in a legislative grey areas when regulations fail to keep pace with the technological advances (Global Banking & Finance Review, 2018). This is because both

regulators and industry officials lack up-to-date analytical and data skills to cope with the rapid changes in technology, especially with the inter-connectedness of financial markets due to the global nature of FinTech (Iwamoto et al., 2018).

Thankfully, FinTech has started to respond to these challenges through the development of regulatory technology (RegTech), which presents an opportunity to apply innovative FinTech paradigms and big data analytics to regulation and compliance through algorithmic and automatic regulation. Other efforts have also begun to take shape in order to help FinTech firms overcome the regulatory difficulties faced, such as regulatory sandboxes where new FinTech products, models and services can be safely tested with customers (Treleaven, 2015).

Security and Privacy

The issue of regulation is important as its implementation is essential in protecting consumers from the misuse and mishandling of their private data in FinTech companies. As the use of FinTech proliferates, its cyber vulnerabilities become more alarming as the increased sophistication and scale of cyber-attacks pose a significant threat to the security and privacy of customers' data on digital channels (Ozili, 2018).

While FinTech start-ups do not have the same budgets as conventional banks when it comes to data security, the customer information these start-ups hold is just as sensitive. This means that FinTech firms need to do more with less resources in ensuring overall security excellence by building a heavily fortified network as well as maintaining a firewall configuration (O'Dwyer, 2017).

FinTech firms that fail to pay careful attention on the potential security threats truly operate at their own peril as they will be the next targets of hackers and other cybercriminals. Take Wonga for example, where this FinTech firm known for its payday lending was hit with a massive data breach in 2017 that ended up affecting almost 250,000 of its users in which sensitive data such as their names, addresses and bank account numbers were stolen (Jamieson, 2017).

These cybercriminals find their way into the systems of these companies primarily through social engineering techniques such as phishing as well as the technical hacking technique such as penetration testing. However, they vary their attack methodologies depending on the target or even after a specific period, which means FinTech firms have to always be on their toes in order to abate this disaster (O'Dwyer, 2017). One way to do this is by employing dynamic security solutions such as a moving target defence (MTD), which leaves hacker in frustration as it enables systems to recognize attack point patterns and identify potentially malicious behaviour without additional programming (Global Banking & Finance Review, 2018).

Concerns regarding data collection and data privacy is another issue the FinTech sector has to grapple with. It is an open secret that many FinTech companies collect large amounts of their customers' data for analytical purposes in sales and marketing, where the data harvested includes sensitive personal data and financial records. In fact, some of them have begun to gather alternative data, where they track and trace the digital footprints of their customers such as on social media (Ng, 2018).

This practice poses legal questions regarding consumer awareness and consent on the collection of their data as well as raises the issue of data ownership. Moreover, it also means that more third-parties can have authorised access to consumers' sensitive data through these FinTech firms, thus making further compromises on consumer data privacy as the third-party may have different approaches to data security (Ng, 2018).

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Hence, it is no wonder that FinTech companies are attractive in the eyes of cybercriminals as they hold valuable data that can be used for lucrative exploitation. Unfortunately, many FinTech start-ups find it challenging to upkeep a set of comprehensive and transparent privacy terms that is in compliance with current regulations as the harsh truth is that most of them are profit-driven and consequently allocate fewer resources for data security and privacy (Ng, 2018).

Technology Integration

To prevent the stagnation of FinTech development, partnerships and joint ventures between traditional financial institutions and FinTech start-ups is necessary as this plays a part of the FinTech ecosystem. However, traditional banking processes may be incompatible with new FinTech models, especially if there is no solid integration plan to bridge them together (Lee & Shin, 2018).

From a FinTech perspective, the onboarding process of technology products in financial companies appears to be complex and under-resourced. Based on a report published by Accenture (2018), this process involves four phases – prospecting, proof of concept, procurement and implementation. The report noted that tactical miscoordination between FinTech start-ups and conventional financial institutions is a challenge that slows down the adoption of FinTech in financial services. The proof of concept phase clearly illustrates this point as the majority of conventional financial institutions judged product feasibility with compliance and security as the top concerns while FinTech firms generally emphasised on funding sources and alignment between use cases and product roadmaps.

The lack of mutual understanding and clear communication between these two entities are apparent to be inhibitors in the efforts to accelerate FinTech mainstream adoption, which further amplifies the need for improvements in technology integration with financial services. One way is to prioritise regular and timely two-way communication between them in order to break free from the confinements of their own mental models in which they perceive that they have different working worlds due to the differences in size, regulation, bureaucracy, cash flows and other factors. For instance, financial institutions can improve productivity by streamlining the decision-making process and give prompt rejections on FinTech ideas instead of baiting developers with a series of “maybe’s” that lead to a dead end (Accenture, 2018).

In regard to issues with FinTech integration, the lack of readiness in financial institutions to embrace FinTech is also another formidable challenge. According to the British Bankers Association (BBA), the footfall for branches has reduced by 30% in the last three years and the number of banking-related mobile applications has doubled in 2013. In other words, the development of alternative channels and lower footfall has led banks to trim their branch networks (DBS Group Research, 2015). The spending has been shifting from physical outlets to IT that it will be banking without branches, investing without brokers and paying without paper.

According to Citigroup (2016b), FinTech companies have both scale and innovation in China. Emerging markets with a high percentage of unbanked population, relatively weak consumer banks, and a high penetration of mobile phones have big opportunities as they are ripe for FinTech disruptions. Nevertheless, based on the survey titled “Catching the FinTech Wave” produced by PricewaterhouseCoopers (PwC) Malaysia and the Asian Institute of Chartered Bankers (AICB), 82% of Malaysian financial institutions saw FinTech as a threat to their businesses, however, there was still lack of readiness among the financial institutions in embracing FinTech because merely 47% of the Malaysian financial institutions have placed FinTech at the heart of their strategy (Ganeshwaran, 2016).

Customer Management

A key area that FinTech has to deal with is the loss of human touch in its customer service. Due to the rise of artificial intelligence and machine learning, some FinTech business models leave clients feeling like they are dealing with a faceless entity as they interact with robo-advisors like OCBC Bank's chat-bot "Emma". While the younger generations such as Generations X and Y can somewhat adapt to this due to their tech-savviness, older clients may find it uncomfortable or even unsettling. While intelligent automation is highly productive and can offer personalised service around the clock, it presents another challenge as it is also highly costly for FinTech start-ups to employ (Lee & Shin, 2018).

FinTech is not just about the technology, it is also about the people. So how can these FinTech firms avoid becoming soulless revenue generators? For one, having customer's needs and interests as a driver of FinTech adoption and innovation is key. In the end, the aim of any FinTech is to improve the lives of people by making things more convenient and making them feel satisfied. As the world move towards automation, FinTech companies should also consider offering some level of direct human interaction in their customer service by having a dedicated team to support customers whenever they need help as they continue on their journey with the company (Global Banking & Finance Review, 2018).

MANAGERIAL CONTEXT AND IMPLEMENTATION IN A BUSINESS ORGANIZATION

FinTech is a great tool for all businesses, no matter how small or big they may be. However, there is an entry barrier for its implementation in business organisations due to the regulatory challenge as delved on in the previous section.

Nonetheless, FinTech also shines bright when embraced by businesses due to its usefulness in managing a business' cash flow. In this context, other than the aforementioned innovations such as global payment systems, some of FinTech's notable contributions include artificial intelligence, automation, cloud accounting and open banking (Plumb, 2018). These offer business greater access to data and more powerful tools that could lead to better insight and decision-making in budgeting, forecasting, analysis and resource management.

With the rapid development of technology, artificial intelligence and machine learning in software and apps could just give businesses a glimpse far greater insights than manual analysis can currently offer. With this new breed of business intelligence, business organizations can grasp the opportunity to adjust their marketing in time to take advantage of the situation at hand (Plumb, 2018; Totka, 2018).

One of such tools is Fluidly, an artificial intelligence-powered cashflow management software that enables forecasting in real time and automated credit control. Applications such as these are a huge help for small or medium enterprises (SMEs) as the prospect of having real-time and month-end reports without the cost of employing management accountants will help ease the financial burden of the business organization. After all, the biggest killer of any business is running out of money as 82 percent of them fail due to poor cash flow management skills (Flint, 2018). In addition, overall organizational productivity can be boosted since these FinTech innovations also streamline business processes such as data entry, which in turn helps save much time. This means that more resources can be freed up and used for more value-adding projects.

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KEY TERMS AND DEFINITIONS

Artificial Intelligence: The application of computer science such that a system can learn, reason and store information.

Blockchain: Blocks of data where each block is chained to the next through the use of hashes.

Cryptocurrency: A digital form of currency.

Distributed Ledger Technology: The storage of data as a digital list of transactions where each participant in the network as the exact same copy of it.

Fiat Money: A medium of exchange in which its value is derived from supply and demand as well as human belief.

Financial Technology: The combination of finance and information technology.

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Chapter 2

FinTech:

A Study of Enablers, Opportunities, and Challenges in the Banking and Financial Services Sector

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ABSTRACT

Businesses have been forerunners in providing innovative techniques and technology to the market. These emerging processes, techniques, and technologies have disrupted the existing ones and met the requirements of the existing customers. Today's banking and financial sector is facing an unprecedented change wherein various new players are entering the market and disrupting the traditional modes of operation. These players are a part of the latest disruption in the banking and financial sector, which is popularly known as Fin Tech (which is an amalgamation of finance and technology). They are providing alternative solutions and business models that are overhauling the manner in which this sector and its customers function. This disruption not only opens doors for completely different business opportunities but also poses challenges to the existing set up of business. The chapter aims to study the emerging trends associated emerging opportunities and challenges of FinTech in the banking and financial sector globally.

INTRODUCTION

Business has existed since the early times of human race. Though started with simple barter system involving exchange of goods for goods and services, business has undergone multiple changes to meet the varied requirements of human beings. Businesses have reformed and renovated the ways of dealing with the ever-changing requirements of the market. In this reformation and renovation of business models, technology has played a very important role. In fact, it can also be said that change in the business models have been possible due to the new techniques and technologies provided by the businesses themselves. The changes ushered by the technological innovations have made it possible for the businesses to meet the requirements of the existing base and extension or creation of new market bases. Today, technology

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in business is an inevitable requirement. As time progresses, the business world is leaning more and more towards it, making it almost impossible to separate the two from each other. The primary objective of business is to generate and maximize returns for its stakeholders. To achieve this objective, businesses need to be innovative. Technology facilitates in providing innovative solutions to businesses which in turn makes them profitable and sustainable in the long run. In order to be sustainable, technology needs to be sold and accepted –which is made possible only by business. Thus it can be said that business and technology are complementary to each other and the existence of one without the other is not possible.

While constructing new playing fields for the existing businesses, technology has also posed some challenges for the existing businesses in the related and other fields. For example, the introduction of smart phones have not only created new markets for apps, online transactions, easier communication – thus creating a full package for information sharing, communication and entertainment through the usage of internet .But at the same time seriously damaging the photo reel business, markets for audio and video entertainment, postal services, to name a few. Thus, a new technology not only opens doors for new opportunities but also slims down the existing ones and creates windows of challenges. The same holds true for the banking and financial services sector.

The banking and financial sector today is amidst an insurrection of unprecedented opportunities and challenges which have been ushered by the fourth industrial revolution. This fourth industrial revolution is driven by Financial Technology popularly known as FinTech, which symbolizes innovative products from new startups or the adoption of new approaches by existing players in the financial space, with technology as the key enabler. Industrial Revolutions have overhauled the production processes of goods and services for commercial purposes. While the first industrial revolution resulted into mechanized production, the second led to mass production and the third resulted in automate production. The first industrial revolution employed steam and power, the second one utilized power, and the third one functioned on electronic and information technology for revolutionizing commercial production. The current fourth industrial revolution is building upon the third and is characterized by a fusion of technologies that is blurring the lines between the physical, digital and biological spheres (Schwab, 2016).

FinTech as ushered by the fourth industrial revolution is a broad phenomenon that is evolving daily as more technology entrepreneurs enter the industry and transform it according to social needs. On one hand, FinTech could be considered a financial service, which is intervened by innovative technologies to satisfy the requirements of tomorrow: high efficiency, cost reduction, business process improvement, rapidity, flexibility, and innovation (Dapp, 2014). On the other hand, FinTech also refers to companies – and, even more typically, to start-ups, which serve as enablers of these services (Zavolokina, Dolata, & Schwabe, 2016).

The global FinTech industry has witnessed phenomenal rise in the volume of investments. The total global investment in FinTech remained close to \$31 billion, with venture capital investing of \$2.1 billion in insurtech across 247 deals and blockchain accounting for \$512 million of investment across 92 deals (Pollari & Raisbeck, 2018). The number of FinTech deals globally rose from 1,800 deals in 2016 to 2,700 deals in 2017 (Accenture, 2018). This increase in FinTech investments and deals is spread across continents and indicates the rising demand for new digital innovations in the financial services area, as these technologies prove their value, acceptance and applicability.

This chapter in its current form aims to study the enablers, opportunities and emerging challenges of FinTech in the banking and financial sector.

Enablers of FinTech

For long, the large and established players of the banking and financial sector had advantages of being sole players due to their financial strength, size and area networks. With the advent of the FinTech revolution, this sector is at the brink of major overhaul today. The enablers for this fourth industrial or FinTech revolution can be classified as under:

Global Financial Crisis: The year 2008 witnessed one of the worst financial crisis since the great depression of 30's. This crisis hit the global banking and financial services sector very badly. The banking and financial services sector became busy to save their remaining assets from getting affected by the crisis and recovery of the dues. The regulatory authorities enforced laws and rules to salvage the damage, bring stability to the markets, and restore the residual customer and investor trust. These changed rules and laws demanded immediate and strict compliance from banks and financial services sector. As the banks and financial services sector took time to understand and incorporate these regulatory enforcements in their day-to-day functioning, innovation of products and services took a back stage.

Rising Customer Requirements: During the time of crisis, there was a whole new generation of millennials (also known as Generation Y) who were tech friendly and wanted solutions, which were not being offered by the traditional players in this sphere. This segment of population was globally mobile and wanted products and services that were fast, efficient, effective and pocket friendly. The kinds of services being offered by the traditional players in the market were unable to meet these challenging requirements. This created a gap between what these new age customers wanted and what the market offered.

Emergence of Non-Traditional Financial Players: Due to the financial crisis, the traditional banking and financial sector, got busy with legal compliance and salvaging their assets and reputation and so devising and offering new products and services took a back seat. The non-traditional financial players were quick to realize this gap between increased customer expectations and complacency on part of traditional players. They began filling this gap with compelling offers, taking advantage of the latest technology to deliver better value propositions to customers in a number of areas and even creating new customer segments. These players disrupted the existing structures and paved way for new solutions that were enabled by the advances in Information Technology (IT).

Advances in IT: The advances in IT has led to revolutionary changes in communication, transportation and has been one of the leading facilitators of global business. While the banking sector was stagnant, customer preferences were changing, the world of IT was experiencing tremendous growth and innovation. These innovations were partly propelled by the non-traditional players who incorporated them to provide innovative banking and financial services. Some of notable advances in IT which have brought about the FinTech revolution are as stated below:

- Machine Learning (ML)
- Artificial Intelligence (AI)
- Internet of Things (IoT)
- Chatbots
- Cloud
- Big data
- Application Programming Interface(API)
- Near Field Communication

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- Bio metrics
- Robot advisory (Robo-advisory)
- Block chains

These enablers have paved the way for FinTech revolution, which is reforming, restructuring and re-inventing the entire way in which today's banks and financial services sector function. Today FinTech is defining the direction, shape and pace of innovation across almost every subsector of financial services. The traditional and non-traditional financial players in this arena have transformed the structure, provision and consumption of banking and financial services . The opportunities created by this revolution are enormous and are vividly changing the banking and financial sector today.

EMERGING OPPORTUNITIES IN THE BANKING AND FINANCIAL SERVICES SECTOR

The demographic and technological enablers of the FinTech revolution have created opportunities for both the traditional and non-traditional players of this sector. Lending, receipts, payments and remittances were traditionally considered forte for the banks and other traditional players like credit unions, insurance companies, asset management companies to name a few. The FinTech revolution has brought a total overhaul to these services and other similar products. Today, not only traditional but also non-traditional companies are coming forward in this arena to provide solutions by bringing in models which are tech as well as customer friendly. The opportunities created in this sector are enormous. The paper in its current form will try to explore a few of these opportunities emerging for the traditional as well as non-traditional players.

Payments, Receipts and Remittances: These areas of financial services were traditionally the forte of banks and other specialized organizations. The adoptions of IT tools have revolutionized these areas. Emergence and rapid use of mobile phones and applications have made it possible to carry out transactions at the touch of a finger. Digital and mobile wallets are giving users alternatives for on-line payments and in-person transactions. The most popular mobile wallets include Apple Pay, Android Pay, Samsung Pay and a large collection of others, including countless retailer and financial institution-branded apps. The most familiar digital wallets are Master Card's Master Pass, Visa Checkout and PayPal (Thienes, 2016). Also, these wallets are collaborating with merchants and crossing over to the brick and mortar space to provide better and enhanced services to their customers. These wallets are also playing an important role in providing financial services to the unbanked and under banked sections of the economies.

The remittance market is worth \$582 billion US Dollars and is another area, that is undergoing enormous change. This sector today, is witnessing the involvement of well-capitalized upstart companies with innovative FinTech solutions that are challenging the established players like Moneygram, and Western Union (Shiva, 2016).This development is not restricted to only western part of the world but has made its inroads across the globe. For instance, most adults in Kenya have M-Pesa accounts, which allows people to send money to each other via a text message (African Business Magazine, 2017).Remitting money to African countries costs more than 10% of the value of money sent and is one among the highest transfer fees paid. Applications like these have made these transfers affordable and quick while providing multiple payment options which are safe and secure (Scott-Briggs, 2017).The use of block chain technology in this area is going to further improve this.

Lending: Providing loans for commercial and personal purposes have been one of the leading activities for banks and credit associations, which require the fulfilment of certain regulatory norms. Despite the increase in the number of banks and their expansive network, there are certain sections of the economy that remain unbanked or under banked. Digital lending is the technology that kick started the FinTech movement and is still one of the most prominent user of IT in the financial services area. Online lenders that include peer-to-peer lending platforms as well as underwriter and lending platforms are using data collected from online activities of consumers and businesses. These online lenders are leveraging this data with the help of machine learning technologies and algorithms to assess credit worthiness of the applicants (*Empirica.com, 2018*), to make underwriting decisions, creating computer programs that can automate loan originations without the need for a customer to ever visit the branch (*Rob, 2017*).

Another area experiencing significant innovation is mortgage lending where technology can significantly simplify the process by digitizing forms, prepopulating known information and ensuring that all documents are in order before a customer proceeds for the mortgage process (Morgan, 2017).

Customer Service: The use of chatbots for supporting the customer service interactions in banks is growing. Currently, these chatbots are said to possess the intelligence of a 2-3-year old. However, as machines do not suffer from physical or learning fatigue, the evolution of a chatbot could be best described as more exponential than linear. So, in future more chatbots are anticipated with improved quality of interactions, speed of responses, and accuracy in decision-making. Banks are planning to adopt models based on regression aided by machine learning to offer better products to its customers. With the support of data scientists, banks plan to gain insights into customer behavior, expectations and responses. The insights gained will help to identify the needs of the customer, and thus aid the banks to design and offer customized products for their customers (Sundarajan, 2017).

Asset and Wealth Management: According to Pricewaterhouse Cooper's Global Fintech Survey of 2016, approximately 60% of asset and wealth managers fear of losing their business to the FinTech companies (Barry & Maya, 2016). This fear of loss comes from various sources like online brokerages, wire houses, and robo-advisors to name a few-which are extensively using accurate predictive analysis supported by innovative data and opinion mining, imagery analytics, machine learning and artificial intelligence techniques. This usage has facilitated in managing risks, ensuring compliance, improving trading efficiency and providing better solutions. For instance, innovations under the umbrella of "robo-advisors" are becoming more sophisticated and, thus, enable advisors to service not only the higher net worth accounts but also the affluent masses who are looking for economical alternatives to receive advice on how to manage their assets (Barry & Maya, 2016).

Another IT development that will change the asset and wealth management sector is "blockchain technology" also known as distributed ledgers. Distributed ledgers are highly flexible and can be used to remove friction from the client on-boarding process, streamline management of model portfolios, speed the clearing and settlement of trades, and ease compliance burdens associated with anti-money laundering (AML) and know your customer (KYC). This will result in elimination of redundant functions like reconciliation of proprietary database, reduced operational expenses and increased opportunities to enhance the customer experience. Besides, the traditional asset and wealth managers, this technology will have broader applications for rollovers, trusts, estates, insurance and other transactions where assets are moved between parties or contracts are executed (Nanayakkara, Smith, Nassir, Hatch, Crespiigny, & Hinkis, 2017).

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It is true that FinTech has created opportunities for traditional and non-traditional service providers in the banking and financial sector. It is changing the manner in which this sector is performing today. But this of technology in the financial sector has its own set of challenges, as discussed in the forthcoming section.

CHALLENGES FOR THE BANKING AND FINANCIAL SERVICES SECTOR

The banking and financial ecosystem today is witnessing disruptions unknown hitherto, like cost commodization, profit redistribution, product customization- to name a few. This has resulted into emergence of players and offerings that are low margin, asset light, scalable, innovative, and compliance easy (LASIC) (Chuen & Teo, 2015). Though the rules and players of the game are changing fast, this sector faces unprecedented challenges today. Some of them area as discussed below.

Talent Acquisition: The financial services sector is facing unprecedented change, where non-traditional financial players are jostling for their place in the market, backed by new technologies. These changes will result into unemployment in the traditional areas and have serious consequences on the jobs of bankers, auditors, lawmakers and accountants. There will be a need to provide alternative employment to these experienced and qualified professionals. Not only this, the future professionals needed in this area shall have to be multi-talented in the fields of design, IT, business, law and marketing. The professionals of tomorrow in this field will be very different from professionals of today-with very different personalities. Acquiring these professionals will be a challenge.

Survival: Banks and other traditional players of this sector are facing fresh challenges from non-traditional players and their offerings that were unknown before. These non-traditional players have read the pulse of the market and created tech savvy and customer friendly products, but are fund and brand scarce. On the other hand the traditional players are fund, time and brand opulent but are scarce on innovative product offerings. Both these players have different strengths and weaknesses and there will be a tough scuffle individually for them to survive. One thing is for sure that the players delivering products which meet and exceed the customer expectations will survive.

Security and Privacy: Each FinTech innovation entering in the market comes with issues of trust and privacy. Every additional device connected to the net is a new attack vector for the hackers. Data is the new gold oil and cybercriminals are waiting to acquire it. The Cambridge Analytica case raises serious issues regarding the use of personal data collected without knowledge or permission to establish sophisticated models of user's personality raises ethical and privacy issue (Davies, 2015). The innovations entering the markets will have to ensure the safety and privacy of the users data. Appropriate mechanisms and procedures need to be designed to ensure that there is no data and security breach.

Regulatory Compliance: As the new models to meet customers' expectations evolve, they pose serious challenges to the law makers. The traditional players were falling under the legal compliance umbrella and were forced to follow the prescribed norms and procedures. But the non-traditional players and their offerings lie outside the legal net. Many times the service providers are not even known to the users and legal system. In such a scenario seeking compliance and adherence to norms and procedures is unimaginable. The regulators will have to adopt a proactive approach and strict adherence to its framework in order to maintain the trust of the customers and at the same time promote the use of better solutions to provide enhanced customer experience and needs.

CONCLUSION

Despite the above challenges, one thing is certain is that FinTech is here to continuously disrupt, innovate, reform, restructure, reinvent and stay in the banking and financial services sector. The future of this sector looks very promising with the emerging dynamics of increased participation of traditional and non-traditional players, customer expectations, regulatory and compliance systems. The road ahead for banking and financial services sector is challenging and tough, but is certainly interesting and worth a watch.

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Chapter 3

New Financial Technologies, Cryptocurrencies, Blockchain, and Challenges

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ABSTRACT

As technological innovation transforms our economies, companies and start-ups all over the world are performing developments on financial technologies called “FinTech/fintech” for a chance to thrive. It even sparked the invention of blockchain and the inception of cryptocurrencies (digital/virtual money) such as Bitcoin. The blockchain technology provides Bitcoin’s public ledger, an ordered and timestamped record of transactions. Blockchain is one of a kind decentralized technology mainly used by fintechs and it is a distributed as well as decentralized ledger that presents a radical, new, modern, and disruptive way of conducting all manner of transactions over the internet. Blockchain-based applications provide many opportunities to create a more sustainable world. With this research agenda, this chapter contributes to the discussion on future avenues for sustainability and information systems research on fintechs, especially cryptocurrencies and blockchain-based platforms and services.

INTRODUCTION

Since the global economy is interconnected, the events that took place in the USA also affected the world, bringing the world’s economy to a standstill. During the first decade of the 21st century the world has witnessed corporate scandals like Enron Corporation collapse in USA and Parmalat S.p.A’s financial fraud and money laundering in Italy, global economic crises –the financial crises of 2007-2008- and rising environmental concerns. Unfortunately the global financial crisis brought out the inherent shortcomings of banks and other financial institutions. The financial crisis also brought out the problems associated with having to store your money with a central authority. After the crisis, people were demanding a currency that would not be controlled by a central authority and there was a wish for a new system of

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money that would not have the shortcomings of regular currencies that leads use of blockchain technology and bitcoin.

Actually financial industry evolution was sparked by the 2008 financial crisis which lead birth of cryptocurrencies. The root cause of what happened during the subprime mortgage bubble in USA and then carried over to the whole global banking system was, in fact, society's unquestioning faith in financial institutions and the integrity of record-keeping systems in accounting and practices. The recent financial crisis has revealed the inadequencies of some of big institutions and has energized a loose coalition of entrepreneurs and information technology companies and start-ups try to reform and reinvent the current financial system (Olleros & Zhegu, 2016).

Digitization and Internet and Communication Technologies (ICTs) has a strong impact on the financial services industry. FinTech has become a popular term that describes novel technologies adopted by the financial service institutions. Many fintech, insurtech (insurance technologies) and banking start-ups have already adopted blockchain's brand-new development environment. The key technological enablers for implementing modern ledger systems are distributed database technologies and blockchain. These technologies offer new community-run, open source based opportunities for developing new types of services and digital platforms (Lindman, Rossi, & Tuunainen, 2017). The most popular example Bitcoin, for example, is a purely open-source project with no formal governance structures, developed, directed and managed by a more or less organized group of developers who themselves are often volunteers.

The blockchain, the ledger that underlies the famous cryptocurrency named Bitcoin, has huge implications for many industries especially on finance. The advent of cryptocurrencies and the blockchain technology has brought dramatic changes. Cryptocurrency (digital/virtual money/cash) is an internet-based medium of exchange which uses cryptographic functions to conduct financial transactions. They leverage blockchain technology to gain decentralization, transparency, consistency and immutability. The de-centralized nature of the blockchain makes cryptocurrencies theoretically immune to the old ways of government control and interference and eliminates need for mediation (Rosic, 2016). Also blockchain technology is kind a financial tool that can potentially play an important role in the sustainable development of the global economy.

After literature review, the rest of this chapter is organized as follows. Section 2 introduces fintech history and evolution. Then next subsection explains cryptocurrencies especially bitcoin and recent developments on that area. Another subsection covers blockchain architecture. Section 3 presents several typical blockchain applications in terms of sustainability. Section 4 discusses some possible future directions and technical challenges. Section 5 concludes the paper.

BACKGROUND

It is obvious that a new wave of technological innovations called "Financial technology" or "fintech" is accelerating change in the financial sector. Technological developments especially after Global Financial Crisis in 2008 are changing the nature of financial services, financial markets and institutions. FinTech is an emerging phenomenon. It refers to the use of technology to deliver financial solutions (Arner, Barberis, & Buckley, 2015). In simple terms, fintech can be defined as a form of technology that incorporates the financial and technological aspects in the delivery of financial services. Also, according to a World Economic Forum (WEF) report, a new challenge for the financial system was growing in the form of

fintech – new entrants that promised to quickly reshape how financial products and applications were structured, provisioned and consumed (Wef, 2017). The advent of Bitcoin and the blockchain has brought a lot of change to the world of finance even the world economy was formerly run using fiat currencies.

From mundane activities, such as paying bills online, to the more elegant ones, i.e developing blockchain-based virtual moneys (cryptocurrencies), the idea of fintech encompasses all processes that make handling finances easier by using digital technologies, internet and computer-powered algorithms. After global financial crisis there was a gradual loss of trust in the fiat currency system that gets more attention to the development of digital currencies. Even if financial sector evolved so fast in the fast few decades, the evolution of the financial processes dates back to 1918 when the Federal Reserve Bank in the United States of America (USA) developed the very first electronic funds' transfer system. In 2018, global investment in fintech hits \$59,5 billion across 875 deals. Given the benefits that the technology brings, it comes as no surprise that 77% of fintech firms are expected to adopt the blockchain by 2020 (Vardhman, 2019). The technology behind bitcoin could transform how the economy works. Fintech is among one of the fastest-growing areas for venture capitalists

More than a decade cryptocurrencies, bitcoin and blockchain has attracted extensive attentions from both industry and academia. They have become hottest topics in fintech and research on it is emerging. These currencies, coins and blockchain ecosystem has been steadily maturing over the past several years. What it really means and what it stands for in the global economy and sustainability is very important. Blockchain, the answer to a lot of obstacles the world has to go through today, can be described as “the trust machine,” indicating that it takes care of trust issues between individuals. Blockchain technology has paved the way for disrupting different business industries over the world. It is touted as one of the most significant technical innovations in digitalization of asset ownership in this century. The most impactful blockchain applications will require tight collaboration between developers, incumbents, innovators, and regulators, adding complexity and delaying implementation (Wef, 2016).

According to Satoshi Nakamoto (2008), the unknown inventor of Bitcoin, purely peer-to-peer version of electronic cash would allow online payments to be sent directly from one party to another without mediation that eliminates transactions going through a financial institution. There are a lot of reasons to do so such as cost of mediation increases transaction costs, limiting the minimum practical transaction size and cutting off the possibility for small casual transactions, and also there is a broader cost in the loss of ability to make non-reversible payments for nonreversible services. With the possibility of reversal, the need for trust spreads. Blockchain is one of a kind decentralized technology and it is distributed as well as decentralized ledger that implements bitcoin architecture. Blockchain technology presents a radical and disruptive new way of conducting all manner of transactions over the Internet. Introducing the blockchain environment will actually enhance the economics because in blockchain, all the transaction are recorded right from the manufacturer to the buyer.

There is a substantial body of literature on blockchain, FinTech and cryptocurrencies from various sources, such as books, reports, blogs, wiki and forum posts, codes, conference proceedings and journal papers. A blockchain is essentially a distributed database of records, or public ledger of all transactions or digital events that have been executed and shared among participating parties. Each transaction in the public ledger is verified by consensus of a majority of the participants in the system. Once entered, information can never be erased. The blockchain contains a certain and verifiable record of every single transaction ever made. Blockchain environment refers to a fully distributed system for cryptographically capturing and storing a, immutable, consistent and linear event log of transactions between nodes in a

network. It is similar to a distributed ledger that is consensually kept, saved, updated, protected, validated and cannot be deleted by the parties involved in all the transactions within a public, hybrid or private network (Risius, Shoprere, 2017).

INTEGRATING FINANCE AND TECHNOLOGY

Evolution of Fintech

The rapid developments in financial technologies and digitization in recent years have a significant impact on all around the world. This new financial technology, called fintech, is rapidly becoming integrated into the lives of individuals and institutions in order to provide faster and easier financial services. The increase in the quality and diversity of the products and services in the field of financial services will result in the growth of global fintech ecosystem and the proliferation of fintech solutions. Moreover, new developments such as cryptocurrencies and blockchain applications in financial technologies allow consumers to access financial services more easily. The technological developments, changing customer habits and the structure of existing sectors show that they can be permanent by creating differences. In recent years, developments in card payment systems in the banking sector for example, the introduction of intensive use of mobile technologies has led to serious developments in the field of fintech. Fintech, the concept of financial technology, is a general concept that shows the applications and examples of technology in the financial sector. Fintech combines financial services with technology (Bilgiç, 2019).

Information and communication systems' technological changes enable new practices and business models to emerge and, in the case of fintech startups, disrupt the traditional financial services sector. Fintech term is often seen as a marriage of financial services and information and communication technologies. Keep in mind that, the term "FinTech" is not confined to specific sectors such as financing or business models (e.g. peer-to-peer lending), but instead covers the entire scope of services and products traditionally provided by the financial services industry. The interlinkage of finance and technology has a long history (Arner, Barberis, & Buckley., 2015). Table 1 is a list of summary items belongs for fintech evolution since 20th century.

Most of these competitive and cooperative fintech companies are in platform business. In digital world, market place startups have become successful for years. Ebay was one of the first examples of market place solutions. Many fintech firms seeking new customer journey to increase customer satisfaction by using new technologies. Countries witness more fintech startup formations when capital markets are well-developed, well-educated labor force available, the latest technology is readily available, and people possess more mobile fintechs subscriptions. When location of fintech companies evaluated, it is seen that majority of the FinTechs are in the USA because of Silicon Valley information system companies. World's second largest fintech market is located in London. London has the best business environment and infrastructure for fintech companies and uses the advantage of being well-known financial center in the world. Legislations encourage investors for establishing fintechs (Göktepe, 2018).

Through innovative use of technologies, firms working on financial technologies are delivering low cost personalized products and are having a significant impact on raising customer expectations. FinTech firms are now penetrating nearly every financial services segment including digital payments, digital insurances, regulators, big technology companies, banking, wealth management services, driving both innovation and disruption. Infrastructure-based technologies such as chatbots, blockcahin, robotics are

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reshaping the future of the financial services industry by enabling greater agility, efficiency, and accuracy. Financial technology firms are encountered in mobile payment systems, online saving tools, daily budget practices, personal financial consolidation, financial solutions for small and new businesses and accounting solutions, robot investment consultants and crowd funding in many different areas globally. FinTech companies and their applications can be a replacement for financial advisors to do simple transactions of people who are in medium and high-level income customer segments.

Table 1. History of financial technologies

Year	FinTech Milestones
1918	The Fedwire Funds Service is established by the Federal Reserve Banks to transfer funds and connect all 12 Reserve Banks by telegraph using a Morse code system.
1950	Modern-day credit cards are introduced starting with Diners Club, founded by Frank X. McNamara
1960	Quotron Systems introduces the Quotron, the first electronic system to provide selected stock market quotations to brokers through desktop terminals.
1966	The global telex network is put in place, providing the communications necessary for the next stage of financial technology development.
1967	Barclays bank introduces the first automated teller machine (A.T.M.),
1970	The Clearing House Interbank Payments System is established to transmit and settle payment orders in American dollars for some of the banks in the world
1971	The Nasdaq is established in the United States. This signals the end of fixed securities commissions.
1973	The Society for Worldwide Interbank Financial Telecommunications is established to solve the problem of communicating about cross-border payments
1982	The first online brokerage, E-Trade, is founded. It executes the first electronic trade by an individual investor.
1983	Online banking is introduced in Britain by the Nottingham Building Society.
1987	The “Black Monday” stock market crash has consequences on markets around the world, showing how the markets are interlinked by technology.
1995	Wells Fargo develops the first online bank cheque account.
1998	A majority of banks in the United States set up the first transactional websites for Internet banking. Confinity (current PayPal) is launched.
2000	Dot-com bubble
2008	Global Financial Crisis
2009	Version 0.1 of the cryptocurrency Bitcoin is released and includes a generation system intended to create 21 million bitcoins through 2040.
2011	Google establishes Google Wallet, which allows consumers to use smartphones equipped with a near-field communication chip to make “tap payments.”
2015	This year, for the first time, more people use mobile banking than those who avail themselves of a physical branch.
2015	The Chinese e-commerce giant Alibaba, announces “smile to pay,” which enables consumers to authenticate mobile payments by scanning their face with a smartphone.
2017	Hyperledger Project is a multi-project open source collaborative effort hosted by The Linux Foundation, created to advance cross-industry blockchain technologies.
2018	Global investment in fintech hits \$59,5 billion

Source: (Zimmerman, 2016 and the author)

Development of Cryptocurrencies

Bitcoin and digital currencies/cashes are based on the idea of a distributed ledger trust mechanism called the “blockchain”, a way of keeping track of trusted transactions in a decentralized fashion (Wef, 2015). Starting in 2009 with Bitcoin, the blockchain technology has developed beyond a global payments system and started to also impact other areas, i.e access to finance, supply chain management, digital identities, smart contracts, health care, land registries or aid, through decentralized applications. Unlike traditional banks, which contain their ledgers in a centralised location, blockchain uses a completely distributed network of volunteer users (miners) from around the world to produce, record, monitor, and verify Bitcoin. Besides Bitcoin, there are currently 1,720 different cryptocurrencies in existence. In simple terms, they are all digital cash. Bitcoin, the first and still most important cryptocurrency.

Cryptocurrencies provide people across the globe with instant, secure, and frictionless money, and blockchains provide the permanent record storage for their transactions. Cryptocurrencies are like digital gold. Cryptocurrencies are also a fast and comfortable means of payment with a worldwide scope, and they are private and anonymous. Cryptocurrencies gave birth to an incredibly dynamic, fast-growing market for investors and speculators. Exchanges like Okcoin, Poloniex or shapeshift enables the trade of hundreds of cryptocurrencies. Their daily trade volume exceeds that of major European stock exchanges (Rosic, 2016).

There are a lot of definitions of cryptocurrency, one is an internet-based medium of exchange which uses cryptographical functions to conduct financial transactions. Cryptocurrencies are built on cryptography and are secured by math, not secured by people or by trust. Cryptocurrencies leverage blockchain technology/distributed ledger technology to provide decentralization, transparency, and immutability. A cryptocurrency insists of a network of peers. Every peer has a crypted record of the complete history of all transactions and balance of every account. When a transaction confirmed by peers, it can not be reversed, deleted, altered and become immutable because of underlying blockchain technology. Cryptocurrency properties are listed below (Rosic, 2016).

- **Irreversible:** Transactions can not be reversed after confirmation.
- **Pseudonymous:** Neither transactions nor accounts are connected to real-world identities.
- **Fast and Global:** Transactions are propagated almost instantly in the network and are confirmed in a couple of minutes.
- **Secure:** A public key cryptography system keeps cryptocurrency funds. Only the owner of the private key can send cryptocurrency.
- **Permissionless:** There is no gatekeeper. It’s just a software that everybody can download for free.
- **Controlled Supply:** All cryptocurrencies control the supply of the token by a schedule written in the code. Most cryptocurrencies limit the supply of the tokens. In Bitcoin, the supply decreases in time and will reach its final number sometime around the year 2140.
- **No Debt But Bearer:** Cryptocurrencies don’t represent debts, they just represent themselves.

In 2008, an individual (or a group) published a paper under the name of Satoshi Nakamoto entitled “Bitcoin: A Peer-To-Peer Electronic Cash System” and this became the birth of cryptocurrency and digital token systems. Cryptocurrencies are a part of this solution but the major innovation was to achieve consensus without a central authority. One of the most important part of Satoshi’s invention was that shows a way to build a decentralized digital cash system. In the nineties even beginning of 21st century, there

have been many attempts to create digital money, but they all failed. Satoshi's paper was a breakthrough publication described a peer-to-peer version of the electronic cash that would allow online payments to be sent directly from one party to another -using cryptography to secure transactions- without mediation. That eliminates transactions going through a financial institution and a centralized trusted entity (Crosby et al., 2016). Nakamoto (2008) conceptualized the first blockchain from where the technology has evolved and found its way into many applications beyond cryptocurrencies in 2008. Bitcoin was announced as an electronic cash system that uses a peer-to-peer network to prevent double-spending. It's completely decentralized with no server or central authority.

Actually before Satoshi Nakamoto's paper, Haber and Stornetta envisioned the blockchain technology as a way to timestamp digital documents to verify their authenticity. It is hard to verify and determine the authenticity of a digital document, and reveal if the document has been altered. Timestamping digital document could be a solution for this. Their solution was to run the document through a cryptographic hashing algorithm that produces a unique ID for the document. Even if a single bit is changed in the document and it is run through the hashing algorithm again, the unique ID will be totally different. This idea was coupled with the related idea of digital signatures, which can be used to uniquely identify the signatory. Instead of sending the whole document to a timestamping service, users could just send the cryptographic hash value, which could be signed by the service to ensure that it had been received at a certain time and wasn't corrupted. Their paper is a prototypical version of the blockchains that power most cryptocurrencies today (Oberhaus, 2018). Moreover, that research paper inspired Satoshi and in Satoshi's paper has 3 citations by Haber and Stornetta (Nakamoto, 2008).

Again, Satoshi is not the first one who holds peer to peer system distributed concept and virtual currency. In 2002, a Turkish academician Emin Gün Sirer at Cornell University developed a protocol called "Karma". It was a digital currency for peer-to-peer distributed systems. Starting in 2002, Emin Gün Sirer and two fellow students aim was to build one global currency, with no inherent monetary value, which could be used to download digital things by creating the first distributed mint based proof of work. The main problem in decentralization is difficulty of cooperation between different participants and getting consensus. In their paper, they described three important characteristics that a system needs to have in order to facilitate peer-to-peer networks (Mahler, 2018):

- **Distribution:** It must be completely distributed with no centralized functionality or trust;
- **Replication:** Account data needs to be replicated to insure against loss and tampering (always better to not have all of your eggs in one and the same basket);
- **Coordination:** Coordination among the different replicas must be kept to a minimum (in order to minimize traffic).

Karma has proof-of work architecture and came six years before Satoshi did Bitcoin. Karma is designed to solve the freeriding problem. Often malicious participants in peer-to-peer systems consume resources without any contribution to their fair share, or otherwise force other peers into subsidizing them. A secure exchange mechanism ensures that nodes cannot counterfeit karma; an anti-inflation/deflation mechanism regulates the karma supply to ensure that prices do not over or under-flow. Additionally a reward mechanism makes the system incentive-compatible for participants. System also has a mechanism for a completely peer-to-peer scheme for tracking karma transfers protects against adversaries that corrupt a significant fraction of the system (Vishnumurthy, Chandrakumar & Sirer, 2003). Finally, Karma didn't really gain a lot of traction, because of its timing – bitcoin invented after global financial

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crisis- and since it hasn't really been actively pushed as a practical payment system by its creators. The biggest difference to Bitcoin was definitely the way proof of work is being used. While it was only used for minting in Karma, within Bitcoin it is also a very effective way of finding consensus among the different parties (Mahler, 2018).

There are a lot of digital moneys developed. Cryptocurrencies have garnered much attention from the financial and tech sectors, as well as academics. According to coinmarketcap web site, total market capitulation is more than \$267 billion. This is the list of most popular ones among 2326 coins today are shown in Table 2 below:

Table 2. Top 20 Cryptocurrencies by market cap

Name	Symbol	Market Cap	Price
Bitcoin	BTC	\$181.130.315.203	\$10.124,41
Ethereum	ETH	\$20.301.635.913	\$188,98
XRP	XRP	\$11.658.574.752	\$0,27
Bitcoin Cash	BCH	\$5.471.154.208	\$304,61
Litecoin	LTC	\$4.673.384.512	\$74,08
Binance Coin	BNB	\$4.225.800.213	\$27,17
Tether	USDT	\$4.058.848.481	\$1
EOS	EOS	\$3.339.627.202	\$3,6
Bitcoin SV	BSV	\$2.405.469.661	\$134,72
Monero	XMR	\$1.402.145.994	\$81,67
Stellar	XLM	\$1.329.397.784	\$0,067
Cardano	ADA	\$1.281.742.937	\$0,049
UNUS SED LEO	LEO	\$1.196.240.772	\$1,2
TRON	TRX	\$1.167.489.930	\$0,017
Dash	DASH	\$814.699.111	\$90,59
Chainlink	LINK	\$789.181.895	\$2,25
Ethereum Classic	ETC	\$767.813.028	\$6,8
Tezos	XTZ	\$748.435.152	\$1,13
IOTA	MIOTA	\$687.441.177	\$0,247
NEO	NEO	\$680.124.784	\$9,64

Source: (Coinmarketcap, 2019)

First well-known cryptocurrency Bitcoin's backbone technology is blockchain. Blockchain technologies create peer-to-peer environment and provide a trustless environment so that there is no longer a need to rely on a third-party to ensure payment transfers. The technology has in the last decade alone evolved so much as to giving rise to cryptocurrencies. The evolution of Bitcoin and other cryptocurrencies have both drawn significant attention and also threatened the very foundations of the financial system. Next title explains blockchain architecture and benefits in detail.

Blockchain Technology and Its Benefits

Actually after global crisis in 2008, the year 2009 is not the exact year that blockchain concept revealed. Blockchain history dates back to early 1990's by two scientist researchers: Stuart Haber and W. Scott Stornetta. They are both touted as the co-inventors of the blockchain technology. It is certain that several aspects of the Bitcoin blockchain architecture are based on Stornetta's work. They described the concept of a cryptographically secured network of blocks. The first mention of blockchain architecture was held in a publication that Stornetta coauthored described a digital hierarchy system known as a "block chain" that utilized digital time-stamps for ordering transactions. In their paper, they propose a practical, feasible way to time stamp of digital documents without sacrificing privacy. The researchers worked on a cryptographically secured chain of blocks whereby no one could tamper with timestamps of documents. Afterwards they both upgraded distributed ledger system to incorporate Merkle trees that enhanced efficiency thereby enabling the collection of more documents on a single block in 1992 (Haber, Stornetta, 1991).

Blockchain can be defined as a chain of blocks of information. These blocks of information are called as digital ledgers which are chronologically linked and replicated not in a centralized database but in a distributed one. Information can be added as blocks and never deleted/altered and also any change is monitored and validated by the chain. Each block in the chain is protected by cryptographic algorithms, and only authorized participants can access the information. Although private blockchains exists, a typical blockchain is public and identified as "decentralized". There four main kinds of blockchain applications classified as money transfer and payments, property registries, contractual agreements, and identity confirmation. Replacing the dependency on trust with cryptography means that most verification, identification, authentication, authorization and similar forms of assurance, accreditation, certification, and legalization of identity, origin, competence, consistence or authority of persons or assets can be assured by mathematics. (Ljutic, McPhee, 2017).

Blockchain technologies or distributed ledger technologies (DLT) come with a range of benefits that no other technology has been able to provide the business community in the past. Blockchain applications might have a profound impact on development-oriented investment, not only by revolutionizing global payment systems but also through improvements to access to finance, supply chain management, digital identities or land registries. With the new technology, recording, tracking, verifying properties of physical products, linking and sharing will be done in real time. For example, it can effectively reduce human errors, while eliminating costs and time delays that plague transactions in today's supply chains. There are numerous benefits of blockchain such as decentralization, persistency, anonymity and auditability. Following are some of the key benefits of blockchain (Leblanc, 2019).

- **Transparency and Immutability:** As it is a shared database, data are readily available to all parties involved in any kind of transaction, providing maximum transparency. The immutability of data makes it even more trustworthy as well. So, once the data are created, it can't be deleted or altered.
- **Process Integrity and Disintermediation:** The parties in any transaction will know that everything will be done exactly as the agreed upon protocol dictates. Readily available and trustworthy data also eliminate any needed intermediation by a third party.

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- **Lower Costs and Faster Transaction:** Blockchains have a great potential to cut overall transaction cost and time by eliminating the overhead costs of exchanging assets and the involvement of third-party intermediaries.
- **Access to High-Quality Data to Everyone:** All parties involved in a transaction will have accurate, timely, consistent and complete data they need to know to make a well-informed decision.

4 years ago, a World Economic Forum Report states that around 10 percent of GDP by 2027 will be stored on blockchain and similar technologies (Wef, 2015). Blockchain technology has a growing number of financial and non-financial use cases. There is a wide spectrum of blockchain applications ranging from cryptocurrency, financial services, risk management, internet of things (IoT) to healthcare, identity, insurance, real estate, supply chain, contracts, public, government and social services. The economic, political, health care, humanitarian, intellectual property and legal system benefits of blockchain start to make it clear that this is potentially disruptive technology that can have the capacity for reconfiguring all aspects of society and its operations. Blockchain revolution can be broken down into three categories explained in Table 3 below (Swan, 2015)

Table 3. Blockchain Revolution

Year	Blockchain Revolution Explanation
Blockchain 1.0	Currency (deployment of cryptocurrencies in application related to cash, i.e. currency transfer, remittance, digital payments)
Blockchain 2.0	Contracts (entire state of economic, market, financial applications)
Blockchain 3.0	Applications (beyond currency, finance and markets- especially for government, healthcare, science, literacy, art and culture)

Source: (Swan, 2015)

Additionally, distributed ledger technology has several essential features developed in time. One is that it allows a deep transition from a centralized transactional model, which until today has prevailed, to a decentralized one. Distributed, de-centralized system should turn out to be a more robust, trusted and reliable solution than is usually provided by a centralized authority to its stakeholders (Collomb, Sok, 2016). Table 4 below summarizes standard transactions versus blockchain ones.

Table 4. Standard Versus Blockchain based Transactional Models

Standard	Model	Blockchain
Trusted 3rd party/central coordinator/mediator	Paradigm	Trustless system/pseudonymous participants
Centralized server/many clients	Architecture	Peer-to-peer network
Single Copy	Database	Multiple copies
Controlled access/firewalls	Security	Cryptography
Intermediation	Price / Cost	Consensus/proof-of-work
Private	Accessibility	Public

Source: (Collomb, Sok, 2016)

While blockchain technology is effecting financial sector heavily, new industry leaders are emerging. Financial services seems near term future leader of blockchain. Other sectors such as energy, industrial products, healthcare and utilities. For example, from a supply chain perspective, such visibility will help ensure efficient transactions, while promoting food safety, efficient recalls, the elimination of counterfeits, and the assurance of ethical trading partners (Leblanc, 2019). In Table 5 below it is shown that proportions of sectors effected by blockchain’s distributed ledger technology. Industries more than %1 percentage is listed. (PwC, 2018).

Table 5. Industries seen as leaders in blockchain

Industry	Blockchain Involvement
Financial Services	46%
Industrial products and manufacturing	12%
Energy and Utilities	12%
Healthcare	11%
Government	8%
Retail and Consumer	4%
Entertainment and Media	1%

Source: (PwC, 2018.)

Using blockchain technology is one of the effective way for big banks to cut costs. In fact, it’s projected that they can save \$12.3 billion per year and reduce the infrastructure by 30% . For example Ripple, which is one of most important cryptocurrencies designed specifically to be compatible with the existing financial structure, is leading the way by operating with 15 out of 50 global banks (Vardhman, 2019).

Blockchain and the Sustainability Opportunity

Blockchain technology has come to be associated especially with cryptocurrencies, yet the technology can also assist in a variety of other endeavors By placing trust and authority in a decentralized network, rather than in a powerful central institution, blockchain – the technology underlying Bitcoin and a growing number of financial and non-financial use-cases – could reconfigure how we assign, protect and transfer many assets and services, including in the natural environment. (Le Seve, Mason & Nassiry, 2018). Even if there are a lot of advantages of blockcahain technology, there are some issues need to be solved. Unlike fiat currencies, Bitcoin is not linked to a central bank or any institution. It is “mined” amidst sprawling computer farms that require incredible amounts of energy to operate. When it comes to energy consumption, in 2018 the global power needed to create cryptocurrencies could rival the entire electricity consumption of Argentina and be a growth driver for renewable energy producers from the U.S. to China. Miners of bitcoin and other cryptocurrencies could require up to 140 terawatt-hours of electricity in 2018, about 0.6 percent of the global total. That usage is more than expected power demand from electric vehicles in 2025 (Tomesco, Loh, 2018).

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Led by Bitcoin, digital moneys have shown promise as infrastructure for pseudonymous online payments, cheap remittance, trustless digital asset exchange, and smart contracts. However, Bitcoin derived blockchain protocols have inherent scalability limits that tradeoff between throughput and latency. (Eyal, Gencer, Sirer & van Renesse., 2016). Despite its potential, blockchain protocols face a significant scalability barrier and there are sustainability issues. Because of inefficiencies and some protocol based problems, experts continue to develop new coins and protocols such as Bitcoin Ng and Avalanche. One of the important ones is Emin Gün Sirer's team's newly developed 3 protocols called Snowflake, Snowball and Avalanche. They combine the best of Nakamoto consensus with the best of classical. These are fast, efficient and less energy consuming ones compared to Bitcoin. He aims to eliminate non-sustainable proof-of-work mining of Bitcoin. Bitcoin itself is technically very hard to use right now. It's incredibly limited in its scale and its performance and when the network is congested, the fees go too much. With these new systems they call autonomous blockchains, where two people can engage in secure communications and secure data sharing without recourse to a public blockchain — without having to make any of the information public and without a private blockchain, either, without having to designate third-parties to hold their data (Fernando, 2018).

Unlike blockchains that rely on proof-of-work, protocols developed by Team-rocket are quiescent and green. These protocols do not incur quadratic message cost and can work without precise membership knowledge. They are lightweight, quiescent, and provide a strong safety guarantee, though they achieve these properties by not guaranteeing liveness for conflicting transactions (Team-rocket, 2018). Their paper introduces a brand new family of consensus protocols suitable for digital moneys, based on randomized sampling and metastable decision. The protocols provide a strong, robust, efficient probabilistic safety guarantee, and a guarantee of liveness for correct clients. The protocols do not use proof-of-work (PoW) yet achieves safety through an efficient metastable mechanism. So this family avoids the worst parts of traditional and Nakamoto consensus protocols (Demirbas, 2018).

As major technology providers like IBM, Alibaba, The Linux Foundation, Apple and Microsoft invest in infrastructures to support blockchain, it will be easier for a number of applications to move in this direction. The way of business transactions can change by blockchain. Also there are promising outcomes of blockchain applications such as sustainability, reduced environmental impact and better assurance of human rights and fair work practices. For human rights and fair work case, product history clear reports can help product buyers to be confident that goods being purchased are coming only from sources that have been recognized and trusted as being ethically sound. For supply chain case, visibility will help ensure effective transactions, while promoting food safety, efficient recalls, the elimination of counterfeits, and the assurance of ethical trading partners (Leblanc, 2019).

Blockchain technology is not limited to processing bitcoin transactions for example, as one of the USA renewable energy company Solar Bankers plans to apply a far more energy efficient form of blockchain technology to the energy sector and develop solutions for off-grid electricity networks with the aim of helping developing countries expand rural electrification. Their decentralized ledger system would enable individuals to trade energy amongst themselves without a utility company as a middle man. Their system uses the highly scalable and efficient blockchain platform to create a digital currency system for effective and secure electricity trading. Solar Banker's model is currently being tested in a pilot project in Izmir, Turkey. The model tested by Solar Banker together with the Turkish company named Enerclever. The model could allow remote areas in developing countries to better participate in the global economy in a sustainable way (Jost, 2018).

FUTURE RESEARCH DIRECTIONS

Fintech includes different sectors and industries such as banking, education, fundraising and non-profit, health care, intellectual properties, smart contract, investment management. Fintech also involves the development and use of cryptocurrencies and its underlying technology blockchain. Under fintech umbrella, blockchain is a distributed database technology that maintains a continuously growing list of data records in blocks that are confirmed by the nodes participating in it. Swan (2015) presents seven technical challenges and limitations for the adaption of blockchain technology in the future research directions:

- **Throughput:** The potential throughput of issues in the Bitcoin network is currently maximized to 7tps (transactions per second). When the frequency of transactions in blockchain increases to similar levels, the throughput of the blockchain network needs to be improved.
- **Latency:** To create sufficient security for a bitcoin transaction block, it takes currently roughly 10 minutes to complete one transaction. To achieve effective security mechanism, more time has to be spent on a block, because it has to outweigh the cost of double spending attacks.
- **Size and Bandwith:** There is a limitation in the number of transactions that can be handled (on average 500 transaction in one block). If the blockchain needs to control more transactions, the size and bandwidth issues have to be solved.
- **Security:** The current blockchain has a possibility of a 51% attack . If this occurs, a single entity would have full control of the majority of the network's mining hash-rate and would be able to manipulate blockchain. To solve this issue, more research on security is necessary.
- **Versioning, Hard Forks, Multiple Chains:** A small chain that consists of a small number of nodes has a higher possibility of a 51% attack. Another issue emerges when chains are split for administrative or versioning purposes.
- **Usability:** The Bitcoin API is difficult to use. There is a need to develop a more developer and use friendly API for Blockchain.
- **Wasted Resources:** Unfortunately bitcoin mining wastes huge amounts of energy. The waste in bitcoin mining is caused by the "Proof-of-Work (PoW)" effort. There are some alternatives in industry fields, such as "Proof-of-Stake (PoS)". With PoW, the probability of mining a block depends on the work done by the miner. However with PoS, the resource that is compared is the amount of Bitcoin a miner holds. The issue with wasted resources needs to be solved to have more efficient mining in Blockchain.

Governance is another issue and future research subject. Governing a blockchain is a substantial obstacle. Even if a blockchain is permissionless, i.e. anyone can join and leave at any point in time, the core developers are making daily decisions on behalf of the other blockchain users. Therefore it is appropriate to understand whether Bitcoin is actually decentralized (Gervais et al., 2014).

During the past years, efforts has been made by some companies to prevent time-consuming activities such as IBM. In 2019, IBM announced a blockchain-based supply chain verification network, aptly named "Trust Your Supplier" (TYS). IBM said that YYS is "designed to eliminate manual time-consuming processes and help reduce the risk of fraud and errors, ultimately creating frictionless connectivity across supply chains and designed to improve supplier qualification, validation, onboarding and life cycle information management." (Chitkara, 2019).

It is widely accepted that the computational architecture of blockchain creates a wide range of potential uses. For instance, by providing an immutable, distributed ledger, it can help to facilitate not only peer-to-peer payments, but also manage records, track physical objects and transfer value via smart contracts, all without a third party or manual reconciliation. Besides energy needs, developments in computer processing power and networked computer systems have facilitated advances in blockchain applications, while the domination of smartphones has made digital wallets possible and increasingly relevant. Additionally, there has been a proliferation of IoT (internet of things) and AI (artificial intelligence) applications that can automate bigdata collection and processing for use in blockchain platforms (Wef, 2018).

CONCLUSION

Today, it is clear that financial institutions will have to invest in fintech to avoid becoming obsolete. It is clear that a lot of fintech companies try to develop applications using blockchain technology. Blockchain technology currently revolutionizes the storing, management and transfer of value between digital identities in many economic sectors. Blockchain technology has been holding many promises for not only cryptocurrencies and the financial sector, but also for other industries such as insurance, energy, utilities, health care, intellectual properties. Blockchain is very likely to have a very strong impact on the digital economy and global e-commerce, because of this decentralized transactional model. Blockchain related interest and investment are so high, and the technology has shown itself to be capable of driving major change. The important thing is that blockchain can be programmed to record not only financial transactions, but anything of value. Blockchain is rapidly revolutionizing the global economy.

After a decade the first Bitcoin white paper, blockchain technology is now studied by academics, experts, companies and governments to find possible use cases for efficiency and these can possibly trigger the third industrial revolution. Blockchain is the kind of technological breakthrough that has the potential to make global changes. Blockchain technology, in all its forms, continues to evolve rapidly. It is obvious that blockchain technology future looks bright and very attractive in part because of the way governments, developers, firms and investors are investing big as they seek to spur innovations and applications. On the other hand, debate over blockchain's promise, as well as its limitations, is ongoing especially for sustainability. Experts trying to build new protocols, applications and more efficient cryptocurrencies especially in terms of energy consumption. The opportunities that blockchain offers need to be developed and governed wisely, with upfront and continual management of unintended consequences and downside risks. Blockchain for environmental sustainability and natural resources management use-cases are rapidly evolving and promising.

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KEY TERMS AND DEFINITIONS

Bitcoin: A decentralized digital currency without a central bank or single administrator that can be sent from user to user on the peer-to-peer bitcoin network without the need for intermediaries.

Blockchain: Technology: It is a decentralized, distributed and public digital ledger technology that is used to record transactions across many computers so that any involved record cannot be altered retroactively, without the alteration of all subsequent blocks.

Decentralization: The transfer of authority from central to local government. Decentralization is the process by which the activities of an organization, particularly those regarding planning and decision making, are distributed or delegated away from a central, authoritative location or group.

Digital Money: Any means of payment that exists purely in electronic form. Digital money is not tangible like a dollar bill or a coin. Digital money, also known as digital currency or crypto currency, is a new and upcoming way of storing value. Unlike traditional currency which can be transferred to

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paper money from a bank account, digital money is entirely digital with only a number as an indication of value. The currency is often used by utilizing a digital wallet that can be accessed from devices such as computers, smartphones, and tablets.

Digitization: The conversion of text, pictures, or sound into a digital form that can be processed by a computer. It is the process of converting information into a digital (i.e. computer-readable) format. Digitization essentially refers to taking analog information and encoding it into zeroes and ones so that computers can store, process, and transmit such information.

Distributed Ledger: A database that is consensually shared and synchronized across multiple sites, institutions or geographies. A distributed ledger (also called a shared ledger or distributed ledger technology or DLT) is a consensus of replicated, shared, and synchronized digital data and documents geographically spread across multiple sites, countries, or institutions.

Fintech: Computer programs and other technology used to support or enable banking and financial services. Fintech is the term used to refer to innovations in the financial and technology crossover space, and typically refers to companies or services that use technology to provide financial services to businesses or consumers.

Sustainability: The ability to be maintained at a certain rate or level and avoidance of the depletion of natural resources in order to maintain an ecological balance. Sustainability is a broad discipline, giving students and graduates insights into most aspects of the human world from business to technology to environment and the social sciences. Sustainability focuses on meeting the needs of the present without compromising the ability of future generations to meet their needs.

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Chapter 4

Risk Management in the Era of Blockchain: A Warning and Welcome for FinTech

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ABSTRACT

This chapter intends to document the various ways that the nascent technology, blockchain, and other forms of distributed ledger technology (DLT) can provide both increased and decreased risk as well as offer FinTech industries a fertile environment to pursue key technological advancements that can help shape almost every facet of the financial world. Issues of trust, transparency, and privacy will be explored as it pertains to the execution of blockchain technology within financial sectors. Strengths and weakness will be explored within regulations, legal environments, risk management, and the environment. Based on the findings of a comprehensive literature review, possible solutions and recommendations will be provided for governmental agencies, regulators, and users of financial services with a special focus on Islamic FinTech. Future research directions will also be shared that can assist Islamic FinTech.

INTRODUCTION

In the ever-changing financial world, technology often plays a dichotomous role. In the analogy of a dog and its owner playing fetch, technology in finance (also known as FinTech), is both the dog and the tennis ball. As organizations create new technologies, those technologies fly out into the user-space like a ball. Other technologies are then created to chase the ball like a dog in order to prevent misuse or to alter the course of the ball into a more productive pattern. Rarely, new technologies come about that have the potential to alter the game irrevocably. This occurred when the computer became a ubiquitous object in the home and this is occurring again with the advent of blockchain. Blockchain is a ball that has been thrown too far but has the possibility to improve the vast majority of daily life as well as the financial world. As with many technologies, blockchain also comes with a hefty amount of risk. Risk tolerance is a well understood component of the financial world but, for now, blockchain's impact on

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risk is mysterious. When the computer revolutionized the financial world, there were growing pains that took many forms including fraud, theft, and difficulties both mundane and catastrophic.

Regardless of these pains, progress marches ever forward. According to DiNizo (2018, p. 3 – 4), in 2015 alone, “investments into the FinTech industry grew 75%, surpassing the \$22 billion mark”. Much of this money is spent on new technologies that could force over 20% of reinsurance, commercial/consumer banking, brokerage, fund transfer, payment, and wealth management services obsolete (DiNizo, 2018, p. 4). Blockchain has become the future cornerstone for ways to apply new technologies to improve financial services. FinTech applications of blockchain technologies are far reaching but include “capital raising, trading, clearing and settlement, global payments, deposits and lending, property and casualty claims processing, digital identity management and authentication, and ‘regtech’ solutions” (Zetzsche et al., 2018, p. 1364 – 5). Campenon (2016, p. 110) argues that FinTech currently already heavily rely on blockchain technology. NASDAQ is already using blockchain technology for issuance and share transfers for private companies (Campenon, 2016, p. 111).

In this chapter, a basic history of blockchain will be discussed and future implications for blockchain applications within FinTech will be demonstrated. These implications will take the form of both warnings against blockchain misuse and underestimation as well as welcoming rewards for those brave enough to establish trusted parameters within this cutting-edge technology.

BACKGROUND

Financial technology has always been a part of finance. Long ago, the ‘technology’ component of this pairing consisted of discovering new ways of securing funds and transactions such as coinage. As soon as money was invented as a means to facilitate bartering, technology has needed to keep up with counterfeiting. As such, those behind the economic purse strings needed ways to ensure that the overall institution was safe and secure because, above all else, the economy, financial institutions, and the processes between those individuals and organizations taking part, needed to be trustworthy. Trust is an implicit cornerstone of the financial world. Without trust, all components of the economy would crumble and become meaningless.

This is all the more true when the components turn digital. For example, a trader selling goods across the world would typically deal in either trading of goods for goods or accept payment for goods in the form of a universal currency. For many years, this universal currency took the form of precious metals such as gold or silver (Glass, 2017, p. 466). As time went on, gold and silver became too burdensome, both in weight and in size, to be useful. Governments also found a use for tying the economy to their own particular brand of currency such as the US dollar. For many years these governmental currencies were tied to an equivalent exchange in those precious metals but, over time, stable governmental currencies began to become valuable all on their own (Glass, 2017, p. 467 – 9). This began the inevitable process of decoupling physical materiality from the financial system concerning currency. Credit became a way for financial institutions and individuals to conduct transactions within a particular currency (Glass, 2017, p. 470). When those relationships faltered, the impacts were felt far and wide in the form of financial instability, job loss, and wealth deterioration. This highlights that the financial institution hinges on the concept of trust. An example of this trust can be seen from how various governments handled World War 1. At the time, most governmental currencies were tied to the gold standard but as hostilities increased and more money was needed, the countries printed vast amounts, paying no heed to the gold standard

requirement to back up their printing of cash – instead promising to return to the gold standard values post-conflict (Glass, 2017, p. 479 – 80). Countries, institutions, and individual citizens were required to trust that this would be the case in order for the financial world to perpetuate during catastrophe.

One particular invention changed the landscape of the financial world – computers. Brummer and Yadav (2019, p. 254 – 5) attributed the ubiquitous nature of the computer gave rise to many of the technological innovations that are credited to creating the modern era of FinTech. ATM machines, store credit, and financial data creation, evaluation, and storage all originated from the expansion of financial technology from the computer era.

FinTech and the revolution surrounding it comes as a combination of venture capital and technological innovations from tech startup companies (Gomber et al. 2018, p. 223 – 4). At the core, FinTech concerns innovation. Gomber et al. (2018, p. 224) argue that “technology innovation is widely recognized as being the main engine behind economic growth and industrial transformation”. These innovations often come in a disruptive manner.

In many ways, technology represents humanity’s collective future goals. For example, a technology is created that leads to an invention. This invention promises an experience to the user that vastly improves over past experiences but the invention is perhaps clunky or opens up the user to privacy concerns. Over time, this invention either will fade away or be improved upon. Very rarely is a brand-new technology instantly simultaneously useful and safe. Typically, safety, usability, and simplifying daily life come later in time after several iterations of the technology. This iterative component of FinTech is of particular interest, given that trust comes from patterns formed over time. Gomber et al. (2018, p. 224) point out the way innovations beget new innovations at ever increasing speeds. But what happens when technology rushes ahead of trust? This is the conundrum that is Blockchain. According to DiNizo (2018, p. 4), “blockchain poses a threat to governments, international currency converters, attorneys, financial institutions, brokers, and a host of other business professionals.”

Bacon et al. (2018, p. 5) simply describe blockchain as “a type of database”. But from simplistic definition comes a much more complicated entity. Zetzsche et al. (2018, p. 1372) describe blockchain as the manner in which data is stored on a ledger – each block serving “as the container for multiple data points, and all blocks are stored in a specific order (the ‘chain’).” In order to fully appreciate how blockchain impacts and catalyzes FinTech, Bitcoin must be discussed since they are joined at the hip. After the financial crisis of 2007, banking trust was extremely fragile and an anonymous person or entity named Satoshi Nakamoto released a cryptocurrency named Bitcoin as both a banking entity as well as “a more transparent, equitable, and efficient payment system” (Ross, 2017, p. 355). It is important to note that for this chapter, digital currency and virtual currency will be referred to as cryptocurrency so as to highlight the cryptographic technology behind such currencies. As this area is currently developing, various authors will refer to cryptocurrency as digital or virtual currency within their writing. Cryptocurrency’s, main selling point is the removal of intermediaries within the payment process (Surujnath, 2017, p. 263 – 4). Glass (2017, p. 485 – 6) argues that these intermediaries provided a necessary level of trust between transactional parties who do not know each other. For example, a person goes online to buy a shirt from a vendor. Neither the vendor nor the purchaser knows one another on any level so there is no inherent trust that the digital payment will be secure, hence the need for an intermediary such as Visa, Paypal, Apple, etc. to create trust for each party involved. When Bitcoin removed the intermediaries, trust was instead provided by the crypto component of cryptocurrency – blockchain.

Decentralization and anonymity are central to cryptocurrency’s allure. Yin et al. (2019, p. 38 – 9) point out that these attributes also drew the attention of those with more nefarious intentions such as “terror

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financing, thefts, scams, and ransomware” as well as the drug market known as Silk Road. Blockchain provided these core concepts to cryptocurrencies. According to Surujnath (2017, p. 264), this stage in blockchain development is referred to as Blockchain 1.0. With the advent of the smart contract, Blockchain 2.0 arose (Surujnath, 2017, p. 270). Blockchain 3.0 is when the technology is used outside of finance and markets (Ross, 2017, p. 360). Each advancement in blockchain creates more unique opportunities for entities. For example, Ethereum, Bitcoin’s top competitor, is a cryptocurrency that advanced blockchain technology by instituting smart contracts to provide more customization and optimization to the currency’s usage (Surujnath, 2017, p. 264).

An outline of Bitcoin and blockchain is helpful to understand the evolution of blockchain technology in order to see its future impacts on FinTech in both positive and negative ways. Double spending of currency and trust are two core components of any currency system. For example, if a consumer gives a coin to a merchant, there is no way for that consumer to give that coin to another merchant as it is physical in the first merchant’s hand. Similarly, the merchant can inspect the silver coin to determine if it is fraudulent, thus establishing trust within the transactional process. This process is similar with paper money but with the country’s government acting as an intermediary providing trust that the paper money can be redeemed for value. When it comes to a check written against funds in a consumer’s bank account, there are two intermediaries – the banking institution and the government to validate that the money has worth. A check, however, can be written twice and applied against the same value of the bank account, hence why fewer and fewer businesses accept check payment. Regardless, the bank insures that the check will be honored with the merchant and the merchant has trust regardless of the veracity of the consumer. With Bitcoin, there are no intermediaries. All security features for trust and double spending are inherent in the design surrounding the blockchain.

Bitcoin does this by providing a proof-of-work transaction and time-stamping the blockchain so as to verify that the blockchain has been updated and spread across a peer-to-peer network – thus ensuring that each transaction takes place only a single time, gets recorded among a peer-supported network, and occurs securely via cryptography (DiNizo, 2018, p. 8). Proof of work is when the other users connected to the peer-to-peer network add a ‘block’ of data to the blockchain regarding the current transaction in question (Ross, 2017, p. 364). This proof of work is computationally intensive which makes the mining “integral in the issuance of new bitcoins and is a necessary process for transactions to be added onto the blockchain and subsequently verified” (Ross, 2017, p. 364). The transactions are recorded and data is stored on computers spread out across the world so there is no centralized or decentralized hubs that can be vulnerable to attack. A transaction occurs between two people using Public-Key cryptography where each user has a public and a private key and they share the public keys when the transactions is processed so that it can be recorded across the blockchain (DiNizo, 2018, p. 8). Essentially everyone using the system simultaneously shouts their transactions and records them all together, thus preventing fraud as long as the user’s private key is kept private. The currency itself is ‘mined’ from anyone with a computer by contributing processing power towards the maintenance, storage, and processing of the Bitcoin blockchain (DiNizo, 2018, p.8). There is only one way to defraud the system – bruteforce hacking. Bruteforce hacking is using a vast amount of computational power to randomly guess the decryption value. Seeing as each transaction is individualized and the more users that contribute to the blockchain adds additional security and processing power, it becomes more profitable for the hacker to convert their bruteforce computational power towards mining legitimate Bitcoins (DiNizo, 2018, p. 9).

In a centralized ledger, one node connects to all users or entities – imagine a bicycle wheel with the spokes all coming out of the center. The wheel continues to turn even if several spokes are removed unless

the center is weakened. This creates a critical need for security in that central location. In a decentralized ledger, there are a number of nodes with each connecting to with their own individual spokes to users or entities. Similar to social media, in a decentralized ledger, the primary friends may know each other in a community but secondary and tertiary friends may have no connection to those primary friends. This spreads out risk by allowing the system to continue even in the presence of an attack on a number of key nodes. In a distributed ledger, however, all nodes are connected to every other single node. In this system, risk is spread equally throughout the network since no single node has any higher weight or value than any other node. A distributed ledger is the great equalizer of data but with this equalization comes at the cost of control from intermediaries and governmental agencies.

Blockchain technology that is applied outside of cryptocurrencies is also known as distributed ledger technology (DLT) as long as they are not centrally stored and instead distributed across peer-to-peer networks (Bacon et al., 2018, p. 6). Many FinTech ventures are looking at using distributed ledger technology but are still attempting to keep the database centrally secure. This bypasses the true benefit of blockchain which is full distribution. For many users of blockchain, trust in the system relies on the system remaining distributed. If not, the intermediary has a finger on the scale of trust and the whole system is opened to corruption, mismanagement, and being constrained by the decisions of the controlling entity. DLT can also be constructed as either permissioned where an entity or governmental agency has regulating control to permit those allowed to engage in the ledger or it can be permissionless, such as Bitcoin, are peer-to-peer and fully distributed with the code itself possibly being written by the public (Zetsche et al., 2018, p. 1372). The issue of permissionless versus permissioned DLT will be discussed in further sections.

MAIN FOCUS OF THE CHAPTER

Trust is a necessary requirement within the financial world and “places a major role in any kind of transaction between a buyer and a seller on any marketplace platform” (Subramanian, 2018, p. 81). According to Ross (2017, p. 365), the direction of growth in financial institutions is “shaped by the relationship between varying levels of trust and differences in transaction costs”. Blockchain threatens this relationship by disposing of the intermediary. If a merchant does not trust a bank, they will not deposit their funds. If a consumer does not trust their government, they will no longer use that government’s printed money. If an investor does not trust the entrepreneur, they will not provide start-up funds. Trust must be implicit if a system is to survive. Blockchain technology has created a new definition of trust by providing trust solely within the technology of the database without reliance on any actor within it (Finck, 2018, p. 668 – 9).

Risk is also inherent in every financial system that has been used and in many ways is inextricably linked with trust. At any time, actors could perform any number of behaviors that could put the system in danger or attempt to take advantage of others within the system. Risk management has grown more complicated as the systems used become more complicated (Gejke, 2018, p. 149). Trust and risk are paired together, conceptually. The more trust that exists between individuals or entities, the less risk but risk never disappears completely. Even a trustworthy person can create risk through accidents, neglect, or ignorance. Blockchain seeks to alleviate issues of trust and risk by creating a ledger that cannot be altered after those within the network agree upon it (Waldo, 2019, p. 38). Blockchain creates a system where there is no need for trust since there is no one in control in which to place trust. Waldo (2019,

p. 42) points out that trust always exists somewhere and in the case of blockchain, the trust is in the developers of the software. Seeing as blockchain is the root of the data in regards to verification, translation, transcription, and storage, risk permeates each area creating a merging of disciplines. Regulators, lawyers, computer scientists, government officials, CEOs, bank governance structures, consumers, law enforcement, lenders/borrowers, derivatives, stockholders, etc are all tied to the same framework of risk. As such it is difficult to talk about one sector of risk without the blending and melding of other sectors. In the next section, those concerns, along with others will be explored.

ISSUES, CONTROVERSIES, PROBLEMS

Regulations, Risk Management, and Legal Concerns

Governmental regulations can come up against the novel ways that blockchain can be utilized by Fin-Tech. Researchers have pointed out that blockchain may by its very nature violate data privacy laws (Zetsche et al., 2018, p. 1374 – 6). In May of 2018, the European Union pass the General Data Protection Regulation (GDPR) in order to provide a necessary layer of consumer data protection and privacy regarding centralized data storages (Munier and Kemball-Cook, 2019, p. 146). Due to the wording of the regulation, blockchain may or may not be in compliance due to its inherent design. Munier and Kemball-Cook (2019, p. 148) point out three main areas that conflict with GDPR – “the identification of the data control and the data processor”, the right to be forgotten or to have your data erased, and the remit of pseudosymmetry and anonymity. Within blockchain, everyone is simultaneously a data controller and a data processor. Similarly, identities are, by nature, anonymous due to the hashing that the blockchain process performs on writing and updating data. This can be further complicated by some blockchain systems using *salting* to further obfuscate the individual hash by adding alphanumeric strings randomly thus requiring a literally impossible-to-break value (Munier and Kemball-Cook, 2019, p. 150).

At the core of many regulatory concerns is the decentralization that blockchain promotes. Smart contracts are a great example of this issue within regulation. Surujnath (2017, p. 271) describes smart contracts as ambiguous but generally consisting of a non-legally binding contract (in the traditional sense of the word) that the code within blockchain recognizes and self-enforces. Similar to how blockchain is threatening to remove the need for intermediaries such as banks and governmental monetary control systems, there is also a threat to completely change the way that contract law is executed. Surujnath (2017, p. 271) effectively demonstrates this by providing an example of a car debtor signing a smart contract that enforces payment provided there are funds available and, in the event of a lien, the debtor’s car will no longer start. Ross (2017, p. 366) expands on smart contracts by arguing that they are an extremely disruptive technological advancement within the practice of law since they can “facilitate the replacement of banking financial intermediaries”. Yin et al. (2019, p. 42) mirror these findings by finding that “blockchain is a highly disruptive and innovative technology and argues for a more open-minded regulation without attempting to stop or slow its growth with suggestions to amend the existing legal provisions if necessary to create a workable regulatory model”.

In the United States, a single regulatory choice avoided having to determine if Bitcoin was a private currency by treating it instead as a non-currency property (Glass, 2017, p. 502). If Bitcoin were labeled as a private currency, it would be subject to tax law and restrictions based on inflation caused by increasing the money supply (Glass, 2017, p. 500). It is possible that regulators chose this route because they

did not see Bitcoin having the longevity or impact it currently does. Bitcoin is not helped by its unstable price (Glass, 2017, p. 503). Glass (2017, p. 506) equates the regulatory fear around Bitcoin and other blockchain-based economies by equating them to mortgage-backed securities around the time of the economic collapse of 2007 and 2008. Mortgage-backed securities were so trusted at the time that they were blindly being thrown around as a pseudo-currency in the vast majority of the US's financial transactions (Glass, 2017, p. 506). Fear around regulating blockchain technology is rooted in similar experiences in history such as the economic collapse of 2007 and 2008. There is an important note here that it was not mortgage-backed securities themselves that led to the collapse but rather the misplaced trust in those in control of the *value* of those securities. In the example of cryptocurrencies in a distributed system, the trust results from the fact that the blockchain cannot experience greed, malfeasance, or hubris. Instead, the blockchain performs as it has been instructed.

Risk management has often relied on behavioral models with certain parameters in order to determine possible outcomes so as to mitigate their effects (Gejke, 2018, p. 149). According to Yang and Li (2018, p. 3256 – 7), FinTech in China has done little to lessen financial risks over the past several years, instead overlaying and collecting “technical risk, operational risk, and systemic risk” and allowing it to grow rapidly. As such, China is now in a position to provide more effective regulations in order to curb FinTech risk (Yang and Li, 2018, p. 3257). Trust within risk management is complicated as the whole goal is to preemptively assume a breakdown in trust at some point in order to provide damage control or to avoid the incident all together. For example, if I have a behavioral model that demonstrates that newly graduated students rarely pay off student loan debt, instead of risking faulty loans, lenders would instead perhaps choose not to offer as many student loans. While reality is much more complicated than this, risk management presents a way to deal with a known quantity in an unknown world – certain amount of risk is required in certain industries. Blockchain adds additional layers of protection as well as potential sources of risk.

Gejke (2018, p. 153) points out how liquidity risk management can use blockchain technologies to provide “real-time and efficient one clicks services with increased granularity, offering more transparency for identifying and moving cash and collateral around”. However, Gejke (2018, p. 154) also points out that the Bank for International Settlements is concerned that DLT technology could lead to longer settlement times and provide more liquidity risks. Within smart contracts, risk is reduced due to their “autonomous, self-sufficient, and decentralized” nature (Ross, 2017, p. 366).

Research has also been performed that demonstrates that the confusing nature of blockchain also provides a block in practicing law as well as regulatory environments (Walch, 2017). Interlinked with trust, legal concerns regarding DLT have been pointed out by researchers (Walch, 2017; Zetsche et al., 2018). Zetsche et al. (2018, p. 1367) argues that many who brandish DLT and, specifically blockchain, may be overzealous in their assessment that legal liability vanishes when trust goes to the code rather than the institution. This is particularly of importance given the global demand for ever increasing cybersecurity solutions which DLT has been hailed as a savior. These systems are still vulnerable to attack, albeit across a wider spectrum. Instead of having a centralized ledger or database, the risk and liability are spread across all the nodes of the distributed DLT (Zetsche et al., 2018, p. 1369).

Another area of risk with using blockchain concerns storage of data. According to Zetsche et al. (2018, p. 1373), the ledger's data storage needs are only resolved when there is participation from the community nodes. Essentially, if the community picks up and walks away from a particular DLT, the data can become inaccessible. DLT such as Bitcoin account for this possible risk by incentivizing their

Risk Management in the Era of Blockchain

individual nodes with cryptocurrency rewards for maintaining and perpetuating the blockchain's functions (Zetzsche et al., 2018, p. 1373).

Derivatives is another area that is susceptible to disruption from blockchain's implementation. The derivatives market has long existed and is a sector that could be drastically shaped by integrating DLT. According to Surujnath (2017, p. 279 – 80), if the derivatives market implements blockchain technology and loses much of its centralized process, Goldman Sachs estimates the banking industry will save between \$11 and \$12 billion annually. This is an enormous amount simply from removing intermediaries. Surujnath (2017, p. 280) argues that the best way of implementing blockchain within the derivatives market would be to “involve a system of several interoperable ledgers that use multi-sig smart contracts for effectuating transfers and oracles for asset monitoring and collateral management”. It is important to note that this kind of implementation of DLT would include the anonymity similar to Bitcoin. Essentially, the bidders would upload their asks anonymously and smart contracts would select the highest bid and establish an agreement that is every bit as binding as the current method except with less need for dealers (Surujnath, 2018, p. 280). These are the ways that DLT can affect numerous systems without a cryptocurrency yet still disrupt large sections of the financial world.

Environmental Concerns

Many researchers have pointed out one particular drawback from cryptocurrencies as well as peer-to-peer DLT technology and that is the power consumption required to process all the calculations (Waldo, 2019; Weber, 2018). Waldo (2019, p. 42) points out that DLT is not the only system that uses such ‘crowd-sourced’ computational power via the internet such as SETI. Organizations such as SETI allow outside participants to offload computations onto their own computers. This results in a large power consumption increase for these individuals. Weber (2018, p. 52) points out that the servers running Bitcoin consume almost as much energy as the entire country of Ireland. He also points out that Bitcoin miners’ power consumption increase five fold over last year and several “orders of magnitude” higher than years before. Compared to a centralized ledger system such as a typical data server cluster hub, DLT cryptocurrency mining is like burning down an entire forest to cook your family’s dinner. According to Eyal (2017, p. 45), “the rate of energy consumption for Bitcoin . . . will become equal to Denmark’s”. This level of power consumption does not coincide with the recent societal focus on ‘green energy’ and conservation.

Centralized, Decentralized, or Distributed Ledgers

As mentioned previously, the ability for blockchain to create trust just by the technology alone is a core component that appeals to many. This is, however, not a requirement of blockchain. Waldo (2019, p. 42) argues that decoupling the issue of trust from the issue of intermediaries can also create new advances without having to hassle with the issue of trustlessness. For example, banks or other entities can adopt blockchain technology to create ledgers that are actually controlled by those entities, thus creating a system of trust based off of existing layers of trust built through the past history of the financial world. Waldo (2019, p. 42) points out that this centralized system of blockchain ledger transactions could still be monitored by government agencies and watchdog groups. He also points out that in such a centralized system, the ‘leader’ could hash the group immediately instead of requiring vast amounts of computational power in order to link the last ledger with the new one as is currently done in cryptocurrencies like Bitcoin (Waldo, 2019, p. 42). This would also decouple the need for the blockchain transactional system

to create an incentivized digital currency to operate as many of the necessary maintenance tasks such as checking hashed ledgers can occur easier and faster, thus negating the need for these vast sources of computational power (Waldo, 2019, p. 42).

Decentralized systems may or may not have an intermediary or a controlling entity. Within permissioned DLT, these decentralized systems could have several controlling entities who share in order to increase security within the blockchain environment or increase security by providing additional oversight to provide additional trust. For example, a decentralized DLT may have oversight and a permissioned system that is ultimately controlled by an existing banking entity but oversight by either governmental agencies or community members could be provided to increase transparency. Similar to centralized systems, there still exists a relatively high degree of risk given that an entity or entities retains control of the DLT parameters. In cases of permissioned DLT this could open the database up to cybersecurity vulnerabilities

Distributed systems, however, have a much wider presentation than the other two due to the complete lack of intermediaries and oversight. They are also vastly more open and transparent than centralized or even decentralized ledgers – so much so that they open themselves up to further risk. Being an open and public storage, DLT opens up a vast array of market abuse such as “insider trading, tipping, and market manipulation” (Zetsche et al., 2018, p. 1376). It is important to note that these manipulations are nothing new to financial institutions and existing regulations appropriately control for and penalize those behaving in such fashions.

Privacy Concerns

Yin et al. (2019, p. 43 – 4) point out that one allure to Bitcoin and blockchain technology is the privacy it affords while simultaneously pointing out that this increases illicit activities in the system. Anonymity is another core component of blockchain but it does not have to be so. There are ways of creating DLT systems without anonymity or pseudonymity but this will most likely require using a centralized entity or intermediary that has absolute control over the users in the blockchain. Anonymity can lead to “an environment for hate speech and defamatory remarks by individuals who behave irresponsibly with impunity” (Yin et al., 2019, p. 45) but it can also lead to “enhanced societies and flourishing human communications” that help protect from profiling (p. 47).

The data storage method of blockchain, itself, is a privacy concern. Zetsche et al. (2018, p. 1375 – 6) argue that the transparent nature of blockchain creates the possibility to re-personalize the user based on transaction logs and metadata or even assist criminals in stealing another user’s identity. Essentially, with enough metadata it can be possible to rework transactional characteristics for individual users thus granting them possible personal information. Due to the legal concerns listed above, this can cause an issue with existing regulations. Yin et al. (2019, p. 67) have preliminarily shown methods to de-anonymize Bitcoin blockchain, stating that “the assumed level of anonymity of the Bitcoin Blockchain is not as high as commonly believed, and the number of potential owners of a Bitcoin address can be narrowed down to a certain degree”. Such findings raise questions regarding one of the core features of blockchain – anonymity. Another privacy concern exists within DLT due to the longevity of the data. In theory, the data will exist as long as the ledger is being maintained by active users – individual blocks cannot be extricated once connected to the chain. For example, a user on a DLT determines another user’s hashed identity. They position inaccurate data regarding this individual’s past history such as credit worthiness, incurred debt, or other such ill comments. Due to the nature of the blockchain, once that data is secured

and in place, it is immutable and cannot be erased unless the whole chain is dropped (Zetzsche et al., 2018, p. 1376).

FinTech

Fintech is always interested in using new technologies to benefit the financial world. As such, blockchain offers up some real solutions in additional areas such as “insurance, supply-chain monitoring, and Internet of Things” (Eyal, 2017, p. 41). Daj (2018, p. 212) agrees that blockchain and more specifically smart contracts can offer a unique solution for machine to machine communication within an Internet of Things system. This kind of advantage should not be overlooked by the FinTech community.

Another area that FinTech has seen a focus is within the securities industry. According to Workie and Jain (2017, p. 348), DLT adoption represents “the potential to create a fundamental change for several traditional processes in the securities industry through the development of new business models and new practices”. The industry will not just shift or mold around a new technology. Instead, it will be completely reworked into new models. Blockchain will offer those in the securities industry increased efficiency and decreased risk while adding necessary levels of transparency for all involved in the industry (Workie and Jain, 2017, p. 348).

SOLUTIONS AND RECOMMENDATIONS

Out of the conflicting environment between FinTech and regulatory bodies, a new domain has been created in the UK called ‘RegTech’ which specializes in “the adoption and use of technology to help financial services firms to understand and comply with regulatory requirements more efficiently and effectively” (Yang and Li, 2018, p. 3257). A recommendation can be made in developing FinTech countries to pair RegTech growth with regulatory changes so as to create a more stable environment for financial service firms to operate within the bounds of the new legal environment. Creating a regulatory environment conducive to RegTech cannot only decrease friction between regulating bodies and firms but the primary goal is to decrease risk. According to Yang and Li (2018, p. 3258), RegTech benefits both the firms and the regulators by helping firms “to control costs and risks more effectively, liberate surplus regulatory capital, and present new opportunities for FinTech startups, consulting firms, and tech companies” while helping regulators in “the development of continuous-monitoring tools to identify problems as they develop and reduce the time it takes to investigate compliance breaches”. Zetzsche et al. (2018, p. 1365) also points out the benefits of RegTech, stating that it can benefit by providing “automated compliance, administration and risk management, and anti-money laundering and client suitability checks”.

In the Islamic FinTech environment, pairing RegTech solutions while controlled regulations are being introduced allows for both parties to move a measured pace and add stability to a very unstable process. Regulators should use financial technology such as “AI, the blockchain, cloud computing, and big data . . . to assess the risk level, capital flow, and capital use of financial institutions and even individuals (Yang and Li, 2018, p. 3263). Regulatory oversight should not be overlooked as a solution. Blockchain complicates this endeavor since it operates outside of an intermediary. While the data is open for all to see, oversight is difficult given the anonymity of ownership. Yang and Li (2018, p. 3263) and the author recommends blockchain transactions should be visible for all parties so as to promote oversight by both the regulators and the financial entities. In this example, regulators could make use of the ‘clean’ and

immediately accessible data provided from blockchain technology to regulate firms while those firms will have access to the same data. Technology can assist financial regulators also by accurately providing information that leads to a sizeable decrease in information asymmetry (Yang and Li, 2018, p. 3264). This reduction in information asymmetry allows for a much greater control over financial outcomes and a huge decrease in risk. It also allows for all to benefit, not just regulators or profiteering firms. Finck (2018, p. 689) advises regulators to “focus on specific use cases of blockchains rather than the technology itself”. Similar to the disruptiveness caused by the advent of the Internet, blockchain technology is inherently a “neutral technology” and many existing regulations cover the vast majority of crimes committed through blockchain use (Finck, 2018, p. 689). In many ways, blockchain is out of the box and cannot be put back in. Finck (2018, p. 689) points out that “there is no realistic option of preventing the spread of blockchains except for disconnecting citizens from the Internet, or intervening at a protocol level.

Transparency issues abound within DLT such as identity theft, market abuse, insider trading, immutable data, and discovering identities of users. Zetsche et al. (2018, p. 1405) argue that the real issue of DLT systems will not be how they can best assist and grow FinTech but that it opens more users to potential risk than centralized systems. In spite of this, researchers are pushing the boundaries of areas that blockchain can be applied. Susskind (2017) finds that blockchain technology can be extremely beneficial in providing secure online elections due to the immutability of blockchain data and security features inherent in the technology.

As for power consumption from the required proof-of-work transactions in most popular cryptocurrencies, there are possible solutions in future technology. According to Eyal (2017, p. 45), Intel is working on a new way of greatly reducing power consumption by changing the proof-of-work concept into a “Proof of Elapsed Time (PoET)”. PoET would, in theory, allow the miner to run a trustworthy application that idles for a random amount of time and “the miner that is first to awaken is the leader of the consensus round and receives a reward” (Eyal, 2017, p. 45). Unfortunately, this only incentivizes miners to run hundreds of idling low-end computers instead of several high-powered computers. The net power consumption could be the same given enough time (Eyal, 2017, p. 45 – 6). Eyal (2017, p. 46) recommends an alternative that allows miners to use their stronger computers for mining but in a more practical manner while including time-based analysis. Such novel solutions provide an easy alternative to the power waste that is currently occurring while still maintaining a decentralized system.

There are massive benefits from integrating DLT into FinTech as well as existing financial institutions. The application and innovations surrounding smart contracts are worth noting. Many researchers have explored the positive applications of using smart contracts in a blockchain manner (Daj, 2018; Eyal, 2017; Glass, 2017; Halaburda, 2018; Henly et al., 2018; Subramanian, 2018; Surujnath, 2017; Workie and Jain, 2017; Zetsche et al., 2018). Risk is never a zero sum game. It will not be eliminated and blockchain is not going to be a miracle remover of risk. Smart contracts, however, do remove the intermediary requirement and provide much stronger and more binding agreements as they are tied into the blockchain and, potentially, tied to usable funds or even the physical world by using the Internet of Things. According to Zetsche et al. (2018, p. 1386), smart contracts already have legal status in many jurisdictions including certain US states such as Arizona. In this manner they are already legally binding and can be upheld in court. In this case, regulating bodies actually approve and condone the use of smart contracts to create new ways to improve the legal environment.

Another benefit has been discovered in research on how blockchain can more easily bring financial services to billions of people in developing countries through entrepreneurship (Larios-Hernandez, 2017). Across the world there are billions of individuals who are unconnected to financial institutions.

Entrepreneurs could, in theory, utilize blockchain technology to help incorporate these individuals into financial institutions. Larios-Hernandez (2017) points out the need for expanding entrepreneurial growth towards semi-formal financial services for those who have not bought in to the current system. This kind of focus could bring access to advanced services such as lending and other transactional advantages to a user base that has never accepted traditional financial services. Such research points at an area of focus that could be very beneficial for Islamic FinTech entrepreneurs to pursue given the amount of individuals living in rural environments.

Subramanian (2018, p. 82) argues that decentralized markets will have a whole host of positive effects. In traditional buyer and seller marketplaces, Subramanian (2018, p. 82) points out that both the buyer and seller will have an easier time finding products and listing them as well as a reduction in listing errors due to the formation of the blockchain. Transactional costs will also be greatly minimized since there are no intermediaries (Subramanian, 2018, p. 82).

Governmental regulations should aid and buffer blockchain growth in ways that benefit FinTech and the general consumer base. Gejke (2018, p. 153) argues that the growth of blockchain technology will require the support of government and central banks in order for success in the long run. Regulators should also take into account the environmental cost of cryptocurrency and future DLT applications. Given the global environmental concerns that are being discovered, creating and fostering an industry that consumes such a vast amount of power for something as simple as database management is surprising at the very least and possibly irresponsible. As mentioned above, there are innovators and researchers currently working on solutions to this problem but, in the present moment, none exist. Until appropriate solutions are presented, this should be a top priority for blockchain developers.

A final solution for regulation may be key – specifically for Islamic FinTech. Seeing as blockchain offers a new set of systems that need to be regulated, other research has pointed out the benefit of providing a ‘regulatory sandbox’ for both FinTech developers and regulators (Brummer and Yadav, 2019, p. 291). In a regulatory sandbox, regulators provide a real-world equivalent scenario for FinTech innovators to explore and experiment while the regulator maintains a relaxed position to observe what happens (Brummer and Yadav, 2019, p. 291). The benefit with a sandbox is that both the regulators and the innovators get to benefit from new technology. The regulators get to see the decision-making process from the innovators along with how they can ‘break’ systems and the innovator gets a chance to create new products in a relaxed environment free of stiff regulations. Islamic FinTech can benefit greatly by creating a regulatory sandbox to explore potential solutions in controlled environments.

FUTURE RESEARCH DIRECTIONS

One particular area for future research that specifically will help guide Islamic FinTech is within the formation of DLT. There needs to be more research performed on permissioned and permissionless DLT to determine which of these two types of DLT best suit Islamic FinTech needs. This research will determine which scenarios benefit a permissioned DLT and which ones benefit from a permissionless DLT. Each configuration has with it a long list of pros and cons that should be explored in order to determine the best course of action. This future research, in conjunction with other topics, will be integral in establishing a list of ‘best practices’ for blockchain development and implementation.

Future research can also be performed on how best to navigate privacy concerns within DLT. The immutability of data once added to the chain is an alarming trait for new adoption of DLT as well as

regulatory bodies. Privacy obligations will need to be considered if DLT is to progress beyond niche markets and uses. Research can and should be performed to determine if and how privacy concerns can be addressed. There are two particular areas of focus. The first is how readily available transactional metadata, in a large enough quantity, can lead to depersonalization of individual users or at the very least build a composite list of characteristics or traits regarding their identity. In centralized ledgers, this would not be an issue because the metadata would be locked beyond a wall that, in optimal conditions, only the organization with control over the ledger can access. With DLT, that metadata is out in the form of blocks being ever added to the chain. The second privacy area that should be researched regards how to treat how difficult it is to erase data. This issue must be solved in several jurisdictions such as the European Union due to the recently passed GDPR which calls for the 'right to be forgotten'. Zetzsche et al. (2018, p. 1376) argue that "immutability and the requirements of law will clash". Future research should be focused on how to address this issue through innovative avenues of data rewriting, specifically for cases of fraudulent transfers (Zetzsche et al., 2018, p. 1376). Even staunch proponents of net neutrality and freedom of access to data can see the inherent flaw in a system where inappropriate images, hate speech, fraud, inaccurate data, and illicit actions are veritably written in stone.

Another area that needs further research is how blockchain and smart contracts can be utilized specifically within the Islamic Banking institution. Contract law can be difficult within this area and smart contracts offer a novel solution to many problems experienced within Islamic Banking. In particular, research is needed to determine the exact manner in which smart contracts function with top efficiency while ensuring that they still stay within the letter of the law and do not run up against any current or future regulations or governmental agencies. In this area, Islamic FinTech has a truly unique problem ahead and future research could offer a way to link FinTech adoption with a safer version of blockchain technology.

Blockchain regulations should find a natural balance between security and flexibility so as to allow for future technological growth. One way this can be secured is to approach blockchain cases individually and attempt to limit the amount of reactionary regulating. Future research similar to Walch (2017) could look at how behavioral patterns can affect both the adoption of DLT as well as provide recommendations for regulators so as to avoid a panic.

One advantage of blockchain is that, contrary to its name and popular opinion, it is modular and flexible in nature. While the blockchain itself is very rigidly constructed, there are many combinations of technologies and structures that allow blockchain to be customized to the environment at hand. DLT coders and creators can focus on either a permissionless or a permissioned architecture. Permissionless could be a benefit in a buyer and seller environment while a permissioned architecture could be better for securities trading so as to ensure identity and transparency in transactions. DLT could include smart contracts to provide additional security that transactions go according to plan. Smart contracts in general provide a degree of modularity simply by enabling their use, particularly within Internet of Things applications. While it is an incredibly unpopular idea currently, blockchain can still be centralized within an intermediary. This allows the owner control over the use of the technology while still taking advantage of the power of blockchain, especially within supply chain management. Decentralized and fully distributed options can also provide a large degree of control or lack of control if that is helpful for the environment at hand. In general, blockchain is a neutral tool to be used in similarly crafted ways as the early versions of the Internet. Imagination, innovation, creativity, and usability will determine the path blockchain takes – along with necessary regulation.

Risk Management in the Era of Blockchain

Everyone about blockchain is not perfect, however. The power consumption costs of current blockchain use such as Bitcoin need to be addressed. Decentralized and distributed ledger system power consumption rates could be a fruitful ground for future research. There is also the problematic nature of balancing incentive systems that promote continual power drain by providing cryptocurrency. Potential future research could investigate other avenues for incentivizing consumer to buy-in to the DLT process. For example, sociology or psychology could be shed light on behavioral patterns that can help to discover unique ways that people can buy into a system without the need to continually mine at the cost of the environment. As mentioned above, there are novel solutions to create an incentive system that does not require the power expenditure that current systems use. This is an area that FinTech research should be focused on.

Research should also focus on risk management needs. Gejke (2018, p. 154) points out the need for risk managers to focus on the data side of the equation in order to provide a better understanding of future risk within new trends. Seeing as blockchain is a complicated piece of coding at heart, risk managers will need to begin learning more about data and how computer science and information systems specialties can assist in risk management. Risk management will be an important sector as blockchain develops.

CONCLUSION

This chapter has discovered a particular need for many answers to many questions regarding the implementation and experimentation with blockchain. When adding in specific Islamic FinTech needs such as legal requirements and culturally specific values and considerations, there is a true need for an assembly of best practices that fit Islamic FinTech parameters. Most professional systems have an established set of 'best practices. These are a set of flexible but established rules and 'go-to' solutions for tackling problems that occur spontaneously. Blockchain development and Bitcoin oscillating price shifts denote a need for the establishment of a set of best practices. Seeing as Islamic FinTech functions similar yet different than other FinTech networks around the world, there is a real drive to establish parameters before this nascent technology races ahead and cannot be curbed. A preliminary 'best practice' might be securing DLT through permissioned ledgers only when the transparency issues warrant concern. For example, creating a permissioned DLT where the personal identity for each user is known by an intermediary that enables or disables permissions based on activity could be a first step towards a best practice. While this certainly limits the possibilities on the DLT by creating an intermediary where none could exist, it does decrease risk and has been argued to reduce liability (Zetzsche et al., 2018, p. 1406). Other research recommends similar actions by

Regulation hurdles will be painful surrounding blockchain innovations. There is no easy way around this and the growing pains will be pervasive regardless of jurisdiction given the digital nature of the technology. Walch (2017, p. 762) cautions for regulators to have patience and to resist 'herd behavior' as it can create the "potential for misunderstandings about the technology to drive adoption, rather than actual capabilities". Before regulators create new decrees, they should pause to reflect if they are acting in a reactionary way to fears of risk or greed for rewards. Blockchain is not a technology that creates or generates wealth directly. Instead it streamlines, simplifies, and connects in a more seamless way than previous databases. There should be caution in both quick adoption and quick restriction of blockchain technology.

Throughout this chapter, blockchain has been referenced as both representing trustlessness and trust. This mirrors the actuality of blockchain as it is simultaneously, by definition, both a source of trust and inherently trustless. This dichotomy represents the truly unique world that blockchain opens up within FinTech.

There seems to be two different avenues for future FinTech growth within blockchain. First is the lawless, decentralized, trustlessness of a peer-to-peer network writing transactions and incentivizing buy-in from adopters by including a linked currency. This path takes the financial world for a huge spin by negating vast sections of systems the world has relied on for over a century such as banks and paper money. The second path is one where DLT technologies are integrated into the established intermediaries that are currently in place such as banks and governmental agencies. The trust stays where it has – in those entities with control. In many ways, the path chosen by FinTech represents more of a philosophical or ideological one.

The chapter has also argued that DLT is both anonymous in nature yet open to vulnerability given enough metadata to determine a user's identification. This type of dichotomy is a sure sign that DLT is in its infancy and requires further maturing before definitive statements can be made regarding security features and characteristics. As more researchers pick away at the shiny exterior of DLT, the true nature will develop. There is no doubt that DLT will pave the way for vast shifts in FinTech innovation and development but the exact manner and, more importantly, the amount of risk required to do so is still to be determined.

In many ways, this chapter demonstrates many advantages to keeping blockchain and other DLT transactional growth within a centralized system. Canaday (2017, p. 20 – 1) echoes this argument by recommending that future blockchain use should include better visibility of cash transactions to deter fraudulent activity, a full written record of all activity on the ledger, and some measure of personal identification by an authentication process such as a permissioned DLT. Across regulating, privacy, and power concerns, there is a natural stepping stone afforded by allowing blockchain to act as an intermediary itself between a completely deregulated, completely private, and completely rampant consumptive model of decentralized DLT systems and allowing already trusted entities to manipulate blockchain so all can gain the affordances offered by such powerful technology. The issue is complicated when an alternative model is attempted to be created that pushes the financial world completely into decentralized and unregulated transactions. No one knows what that model would look like – the technology as well as the philosophical and ideological frameworks are too unknown. The Islamic FinTech industry needs to consider risk versus reward when it looks at how profitable and powerful blockchain technology can be. In one hand, Islamic FinTech will hold an innovative and unique tool that can shape existing networks and systems to optimize an already established pattern of use. In the other hand, Islamic FinTech holds an unknown quantity with equal parts risk and reward.

There is also a need to allow for a balance between innovation, regulation, and research. If any one sector has too much influence or focus, the growth potential from FinTech will wither away. If entrepreneurs simply focus on ways to integrate DLT into as many avenues as possible, regulators will not be able to keep up the pace. Security concerns will rise and there could be a large threat to the overall financial world. If regulators respond to possible disruptive change with strict regulations, innovation will suffer and FinTech will not reach the peak possibilities for incorporating such strong technology into financial institutions. If both regulators and innovators wait for academic research to provide all the answers, novel solutions born out of innovation and creativity will not occur nearly as often. Within blockchain, there resides a need for a balance for all three of these groups to function interconnected.

Risk Management in the Era of Blockchain

Researchers can provide data analysis that can point to areas of potential growth or risk that could not be discovered without trial and error on the part of the entrepreneurs. Innovators can explore unique new possibilities without fear of running up against regulations that completely void their technological inventions once conceived. Regulators can gauge appropriate response while working in conjunction with those who know the most about the technology at hand as well as avoid knee-jerk reactions that can kick a nascent technology down before it has a chance to grow.

Future regulations need to allow blockchain freedom to grow yet protect against the more nefarious aspects such as crime due to blockchain's inherent anonymity. Islamic FinTech and regulatory bodies could utilize a regulatory sandbox as demonstrated above to assist in determine best practices and initial regulations. Blockchain only works if the trust in the system is based on the technology, not in a controlling body that curbs blockchain use. It must stay as distributed as possible for the full benefits to be felt – especially in regards to the Internet of Things and other FinTech future solutions.

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APPENDIX

Figure 1. A description of a blockchain and a blockchain transaction
(Du et al., 2019, p. 52)

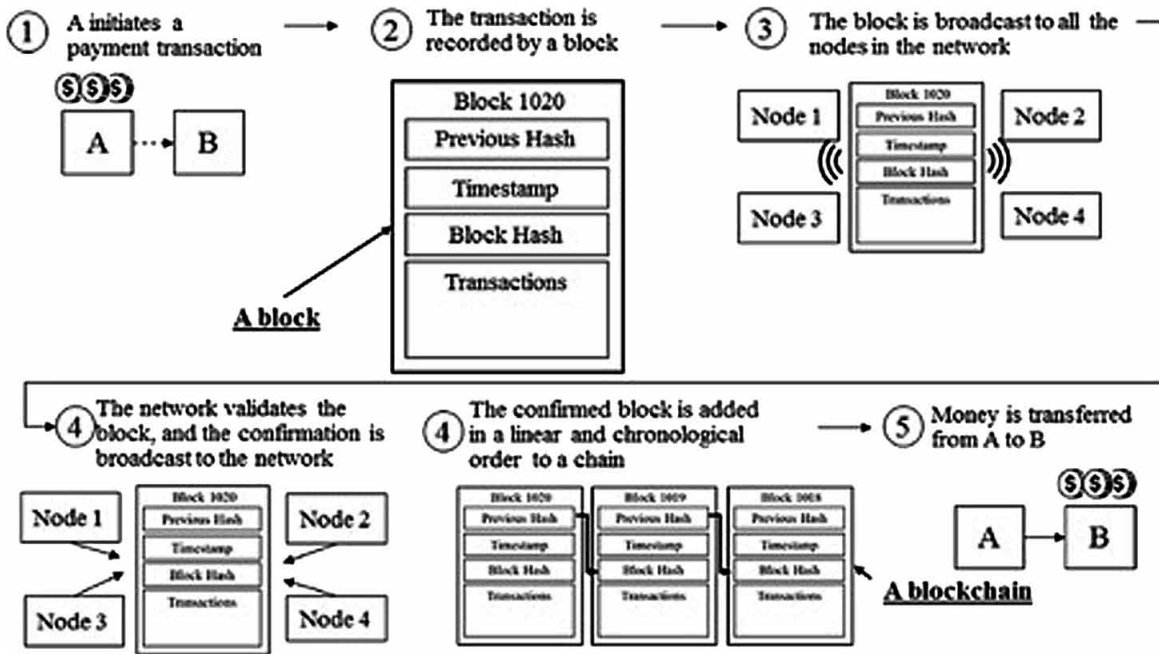
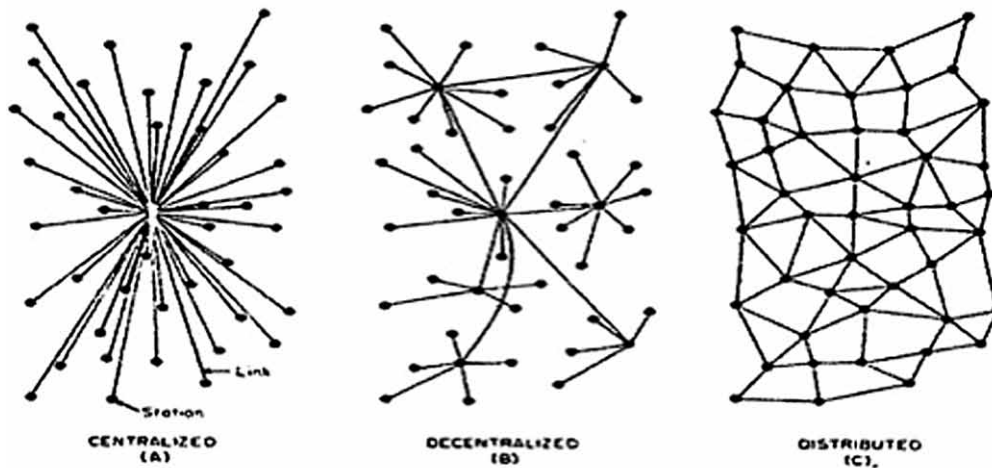
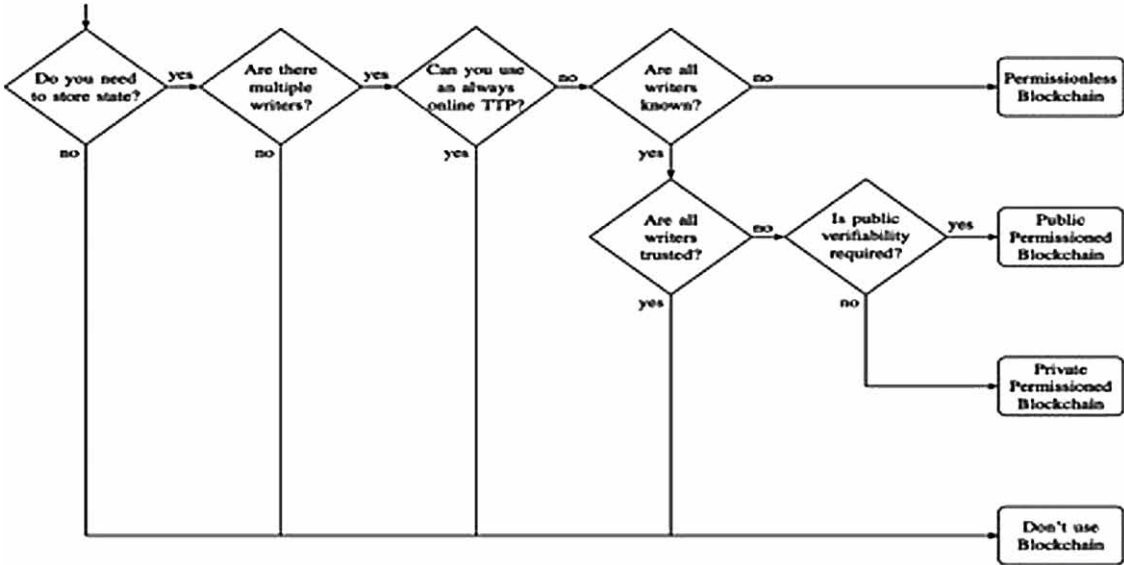


Figure 2. Description of database nodes in different possible configurations. A fully distributed and permissionless DLT will look like Diagram C above with the addition of each individual node being connected to every other node as well
(Zetsche, 2018, p. 1371)



Risk Management in the Era of Blockchain

Figure 3. A decision tree to assist in determining when to use blockchain and what type to use (Munier and Kemball-Cook, 2019, p. 153)



Chapter 5

The Impact of FinTech on Economic Performance and Financial Stability in MENA Zone

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ABSTRACT

This chapter deliberates on the effects of FinTech on economic performance in the context of political instability in MENA zone countries. Using a multiple regression model to estimate time series data based on a sample of 10 MENA zone countries for 2011, 2014, and 2017, the study contends that FinTech's lending activities increase inflation and that this effect could be interestingly moderated by sound policies and regulations. In addition, the authors find empirical support for the FinTech's role as a driver of economic growth and a breeding ground for innovative projects in a context of freedom of expression, association, and media. In terms of practical implications, decision makers are asked to formulate and implement sound policies and regulations that permit and promote the positive role of FinTech in terms of economic performance.

INTRODUCTION

This chapter examines the impact of digital finance on financial inclusion and the stability of the financial system. In the past decade, the information technology (IT) revolution and advancement in encryption and network computing have transformed every aspect of human life, including banking and the financial services industry knew a supreme transformation in banking activities related to innovation and tech-

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nologies. Indeed, with the emergence of virtual currencies, also known as crypto-currencies or digital currencies, the way goods, services, and assets are exchanged faced a fundamental transformation. IT acts as a catalyst for growth in the banking sector; in particular, it supports banking, productivity growth and risk management. IT is a driver of activity and can therefore be used to enhance competitiveness (Porter and Millar, 1985).

As a breakthrough innovation, financial technologies, nowadays known under the term of Fintech, denote companies that combine financial services with innovative technologies (Dorfleitner et al, 2017). More precisely, Fintech was coined to mean innovative financial solutions that have harnessed technologies and new and creative ways¹. Even if, there is not a universally definition, Fintech is seen as a redesign of the financial services sector using entirely new business models for payment, wealth management, crowdfunding, lending and capital markets. Zavolokina et al. (2016) postulate that ‘Fintech’ is a living body with a flexible and changing nature, rather than a stable notion that is transparent and clearly understood by both academia and the media’ (p 12). They further postulate that the emergence of Fintech is the result of three main factors simultaneously interacting and challenging the status quo at the same time: organizations, people and geographical locations (markets). That being said, it must be recognized that Fintech lending was first created around the financial crisis and then has been growing quickly in the last decade. Today, Fintech are experiencing an increasing popularity in the financial markets and in portfolio management as they can be classified as financial assets or commodities to pure store of value advantages. Consequently, banking sector has increasingly moved to a shadow banking sector. According to Matvos, Piskorski, and Seru (2018) the market share of shadow banks in originating residential mortgages nearly doubled from 2007 to 2015.

As in other countries, the MENA Fintech sector is booming, with dozens of new start-ups launching every year. Such changes are expected to have an impact on countries’ economic performance. In this context, digital finance promises to increase the gross domestic product (GDP) of digitized economies by providing convenient access to a wide range of financial products and services (and credit facilities) for individuals, as well as small, medium and large businesses, which can boost overall growth and spending, thereby improving GDP levels. Digital finance can also lead to greater economic stability and increased financial intermediation for both customers and economy. Meanwhile, some other countries are often facing periods of political instability which would influence the relationship between Fintech and economic performance. Previous researches were conducted to study the relationship between digital finance, economic performance and financial stability e.g. [Han, R., & Melecky, M. (2013), Accenture, (2013), GSMA, (2014), McKinsey, (2015), Dermine (2016), Young (2017), Buchak et al. (2017) and Fuster et al. (2018). Our study intends to extend literature on the impact of Fintech on economic performance moderated by political instability. Focusing on digital finance, this chapter offers a discussion on digital finance and explores the impact of digital finance on economic performance in a context of financial instability; a problem that has not been addressed in the literature.

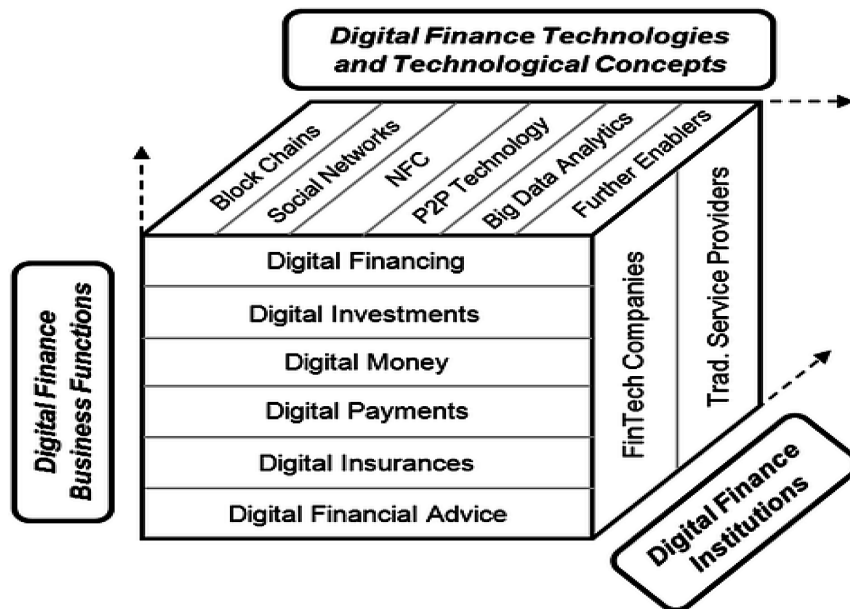
In this light, the main purpose of the chapter is to analyze the impact of Fintech on the economic performance and some contingency factors in MENA zone countries. We discuss the evidence of the Fintech impact on a country’s economic performance. Building on previous researches, this chapter reviews how the Fintech literature tried to address these issues. In section II, we briefly review empirical literature as regards to the determinants of Fintech and their impact on economic and financial environment in order to provide the theoretical basis for the study. The next section focuses on Fintech state in MENA countries. Section IV presents methodology and data sources and some summary statistics

of the variables used in our empirical work where we highlight the empirical results and formulate our conclusions. The concluding remarks are presented in Section V.

THE ECONOMIC IMPACT OF THE FINTECH OPPORTUNITY

The increased use of Big data and alternative data analytics combined with increased use of mobile phones and internet in the developing countries creates a potential for anyone to be included in the financial system. Artificial intelligence (AI) and machine learning (ML) allow researchers to analyze this big amount of data from internet sites and mobile phones. Moreover, digital financial services have great potential to extend the provision of basic financial services through an affordable, convenient and secure environment to the general public (especially the poor) through innovative technologies such as mobile-enabled solutions, electronic money models and digital payment platforms. The figure below presents the different types of digital financial technologies, digital finance business functions and digital finance institutions.

Figure 1. Digital finance; technological concepts, business functions and institutions.



Many research studies have focused on the benefits and risks of digital finance, digital financial inclusion and financial inclusion. Indeed, digital finance and financial inclusion offer several benefits for financial service users, digital finance providers, governments and the economy such as expanding access to finance among the poor, reducing the cost of financial intermediation for banks and technology providers, and overall spending for governments, White et al, (2016). According to Gomber et al, (2017), since 2010, the G-20 and the World Bank have led the initiative to increase financial inclusion in developing countries to help reduce poverty levels in developing and emerging economies (GPFI, 2011).

The Impact of FinTech on Economic Performance and Financial Stability in MENA Zone

As a result of its distributed ledgers based on blockchain, Fintech not only offer some unique advantages to the economy, investors, and consumers, but also pose considerable risks to users and challenges for regulators when fitting the new technology into the old legal framework. Using new technology, Fintech advancement is expected to have huge ramifications over the next decade², particularly in the less developed part of the world in all financial services like saving, loans, investments, payments. Jagtiani and Lemieux (2018) find that Fintech penetrate both highly concentrated and relatively underserved banking and areas where the local economy is not performing well. Weil et al. (2014) argue that mobile money is a mean of transfer and savings and that the speed of mobile money has increased over time, indicating increased use of mobile money in transactions. Adam and Walker (2015) postulate that mobile money should increase the macroeconomic stability of the countries in which it is spread, contrary to popular expectations that this would lead to destabilization of the currency.

Additionally, Kamukama and Tumwine (2012) conclude that the proliferation of mobile payments can disadvantage commercial banks by weakening their liquidity positions. According to Jagtiani and Lemieux (2018), that Fintech lenders such as Lending Club are able to provide loans to clients in areas underserved by traditional banks or defined by limited economic activity, Bromberg, Godwin and Ramsay, (2017). While advanced technology provides benefits to both consumers and lenders, these financial technologies have potential to disrupt and to create new types of risk. Indeed, financial innovation generally leads to higher credit creation, which increases systemic risk. This means that financial innovations, such as Fintech, markets and economic systems are more exposed to systemic risk, Chui, (2017). Academics and decision-makers are nowadays working diligently and thoughtfully to protect consumers and to maintain financial stability while at the same time to create a safe environment for Fintech innovations. Several studies have shown that the macroeconomic risks associated with the expansion of mobile money were minimal.

This chapter aims to provide academics, policymakers and practitioners with a valuable discussion and critical analysis of the financial technologies impact on economic performance of a country. The literature review will provide a backdrop to the issues raised in these research areas and highlight the relevance of Fintech to economic performance and financial stability in the MENA region in a context of political instability.

The Impact of Fintech on Inflation

The first category of studies provides an economic explanation of the impact of mobile money (Fintech) on inflation. Simpasa and Gurara (2012) focused on the potential impact of mobile money on inflation. They confirmed that an increase in monetary velocity could spread inflation, complicating the conduct of monetary policy. Their results are confirmed with the studies of Tavne and Suri (2017) and Iazzolino (2015). In this sense, Aron et al. (2015) and Simpasa et al. (2011) pointed out that mobile money could lead to an increase in the speed of money, which requires regulation to ensure that these products do not detract from the effectiveness of monetary policy. Aron and Sebudde (2015) emphasized the relationship between mobile money and inflation for Uganda during 1994-2003 using multivariate models across equilibrium correction terms. According to them, mobile money is a recent financial innovation offering financial transaction services via a mobile phone, including unbanked people.

In the same vein, Ondabu et al (2015) analyzed the relationship between effective inflation control and mobile money in Somaliland through a sample of 119 respondents selected from the population (managers and staff of Zaad) using a stratified random sampling technique. The study used the quanti-

tative theory of money and modern monetary theory to explain the behaviour of inflation control. The results show that the mobile money service (Zaad) can be an inflation control tool helping central banks to control inflation. These authors proposed recommendations on mobile money transfer and effective inflation control as the use of carefully crafted policies and procedures to maintain client satisfaction. In the same country, Walker (2016) confirmed that mobile phones play a very important role at micro and macro levels. Through a modeling of the emergence of mobile money, this author has introduced a more and more advanced technology of payment of funds in a Dynamic Stochastic General Equilibrium (DSGE) framework with two sectors (urban producer households and rural). Empirical results show that financial innovations help to reduce the incompleteness of markets, and monetary authorities could usefully move from headline inflation to core inflation. These results should encourage policymakers to continue to support and encourage the spread of mobile phones in the countries of the East African Community (EAC).

For Mawejje and Lakuma (2017), the use of mobile money does not lead to high inflationary risks. In addition, Mehrotra and Yetman (2014) examined the effect of financial inclusion on the maximization of monetary policy. Their results showed the existence of a positive relationship between the number of households included financially and the relationship between output and the volatility of inflation. Furthermore, Nampewo and Opolot (2016) have found that in the case where mobile money greatly facilitates transactions, and not the creation of added value, this results in an increase in the speed of money. To combat this problem, Carrick (2016) noted that Bitcoin is a global virtual currency that is not regulated by the government and therefore is very effective to gradually eliminate the risk of inflation.

The introduction and widespread use of credit cards promotes the efficiency of transactions but results in inflation in the absence of monetary intervention. In the event that the monetary authority attempts to restore pre-credit price levels by reducing the money supply, it may have to sacrifice efficiencies. In case of default on credit cards, there is still more inflation and less efficiency gains, Geanakoplos, (2010) and Alvarez and Lippi (2017). According to Zhang et al, (2013) mobile money can affect interest rates as it leads to the creation of credit by commercial banks. The role of mobile money in credit creation has been studied by Nampewo et al (2016), who emphasize the crucial role of savings and deposit mobilization. This author has asserted in his hypothesis that if mobile money leads to economic efficiency through a reduction in transaction costs and a better allocation of resources and credit, it follows that the overall economic activity will be supported. The empirical results show that whenever money and credit coexist, the equilibrium is generally ineffective and that an optimal policy implies a rate of inflation strictly superior to the Friedman rule. Similarly, Smith et al (2006) have argued that the inflation fall does increase the use of cash and credit in low-inflation countries. From Erosa and Ventura's (2002) point of view, financial innovation determines the choice of households' portfolio in relation to monetary and non-monetary assets / liabilities, which reduces the cost of holding assets, non-monetary debts. Their results are confirmed with the studies of Mulligan and Sala-i. Martin (2000) and Attanasio and al (2002).

The Impact of Fintech on Business and Investment Freedom

The second category of studies provides an economic explanation of the relationship between business freedom and Fintech. According to Ruberti et al (2018), the evolution of financial technology is based on innovations in processes, applications, products and business models such as Fintech. This author has studied the effect of Fintech on private investment in sub-Saharan Africa. The results show that Fintech supports private investment by leveraging existing mobile platforms to reduce the frictions of fund in-

termediation between savers and investors. Although the growth of mobile payments in this region is not directly related to financial intermediation services, providers of this method of payment are beginning to rely on the maturity of the technology platform. These results are confirmed by BRI, (2012) and CBSB, (2017), who said that Fintech promotes investment growth in the region by improving the efficiency of financial market infrastructure, including regulation and clearing in sub-Saharan Africa compared to other regions of the world. In addition, Pejkovska (2018) examined the effect of Fintech on the global financial services sector for two countries: India and the United States. Due to the extensive scope of Fintech, the paper focuses solely on three elements, namely blockchain, cryptocurrencies, alternative payment methods and investment and banking, it uses arguments and empirical evidence referring to three different geographical and political regions in EU. The results show that the current regulation of Fintech in the above-mentioned regions is inappropriate and could have potential negative effects on the global financial services sector, such as cyber-security corruption, data breach and the use of data. Fintech services for illegal purposes. Therefore, EU, India and US authorities need to focus on creating appropriate regulation for Fintech to mitigate potential negative effects.

From the point of view of Gomber et. al (2018), Nicoletti (2017) and Haan (2015), Fintech has begun to attract significant investments, which are expected to increase in the future as more technologies are deployed in the financial services business. However, there are also threats related to these elements of Fintech, which are rarely addressed but which could have a negative impact on the entire financial services sector. Potential negative effects are mainly explained by the lack of appropriate regulation with respect to the activities of Fintech companies. The study of Athey and. al (2016) showed that Bitcoin had already been used as a means of payment to buy drugs and weapons on dark-web platforms worth \$ 11 billion. Due to the anonymity of Bitcoin, those guilty of these acts could not be identified. The inability to trace the origin and destination of transactions facilitates the commission of financial offenses such as money laundering and tax evasion. Such actions could further reduce public confidence in the financial services sector and aggravate its already fragile reputation. In this sense, Prescott & Larose (2016) argue that the United States is a concrete example of corrupt cyber-security and breach of data privacy. A Fintech start-up, offering alternative payment solutions, assured its customers that their data was safe, but when a cyber-attack corrupted their cyber-security system, the company compromised the financial and personal data of its customers. This example shows why it is important for the EU, US and India authorities to engage the Fintech companies with the regulations in force and ask them to provide first class cyber-security to ensure data confidentiality.

The Impact of Fintech on Unemployment

The third category of studies offers an economic explanation of the relationship between unemployment and Fintech. The Broby study (2017) analyzes the impact of collaboration in financial technologies on production and productivity. The results show that collaboration in this sector will increase the production and productivity of labours and is also very positive for employment. This study is confirmed with the studies of Clarke and Broby (2017) and Davine and Dickson, (1983). A Citigroup study in 2016 predicts a decline in US bankrolls by 30% in ten years from 2.6 million in 2015 to 1.8 million in 2025. In Europe, the downsizing would reach 37% and even 50% in UK. In the Canadian example, the banking system experienced disruptions in 2008, particularly because of a rigorous regulatory framework; financial innovation has not seen the growth that has been observed in other countries. In London, for

example, the many layoffs following the 2008 crisis enabled former employees who understood the challenges of the financial sector to innovate, which favored the emergence of Fintech.

Such phenomena have the potential to change business models, bring about structural changes, and/or change any other aspect of the system under investigation. It is about real change with real Managerial and research implications, Balyuk, (2017). Based on the previous theoretical and empirical underpinnings, this study addresses the two following research questions: What is the impact of Fintech on economic performance in MENA zone? And how can political instability moderate the relationship between Fintech and the economic development of MENA countries?

MENA ZONE: AN EVER-EVOLVING FINTECH SPACE

Across the Middle East, Fintech is driven by technology-enabled innovation that improves existing financial services, but also provides routes for unbanked populations to access financial services. In fact, for emerging economies whose banking penetration is low, financial inclusion is relevant theme. Across the Middle East and North Africa (MENA) banking penetration, measured by the percentage of adults that have bank accounts is on average slow. The MENA zone countries have the worldwide top percentage of unbanked population. In fact, in 2014, only 14% of population owns a bank account. Simultaneously, the region boasts a huge proportion of youth tech-savvy. Moreover, in 2017, 365 million unique subscribers accounting for 63% of the population in 2017 reveal a high penetration mobile-phone rate while mobile-Internet penetration stand at 38% as of 2016. It is expected to grow to 48% by 2020. According to Sanne Wass (2018), a global trade hub and home to regulators with big Fintech ambitions, the Middle East could be the next location for trade finance technology to bloom. By 2022, the Fintech market is estimated to reach a value of US\$2.5 billion across the broader MENA region.

Table 1. Current regulatory environment³

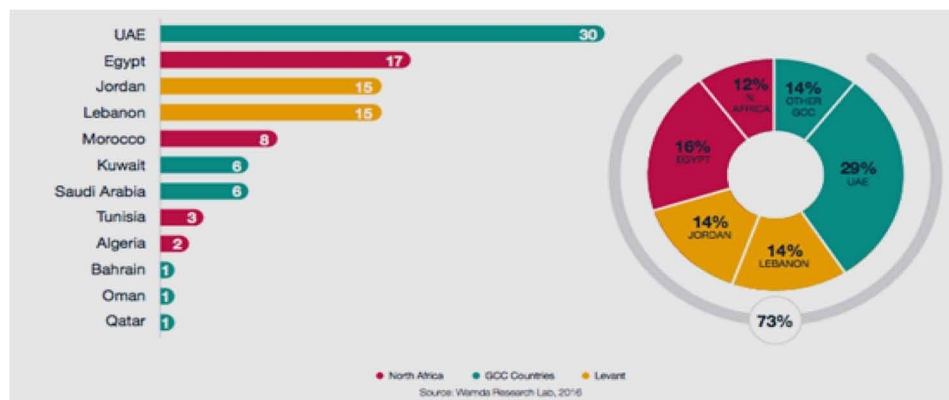
	Cryptocurrency Trading/ICOs	Payment Services/ Mobile Wallets	Crowdfunding	Sandbox/Regulatory Testing License?
ADGM*	1	1	1	Yes
UAE	2	1	1	Yes
DIFC*	2	2	1	Yes
BAHRAIN	3	2	1	Yes
KSA	4	3	2	Yes
KUWAIT	4	1	4	Yes
JORDAN	4	1	2	No
EGYPT	4	1	2	No
LEBANON	4	1	1	No
MOROCCO	4	1	2	No

1. Regulations implemented 2. Regulations planned 3. No specific regulations, but conducted under regulatory supervision 4. No specific regime now or anticipated in the near future.

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In this section, we highlight key trends and developments in financial technology (Fintech) across 10 different MENA jurisdictions. Digital transformation of financial services across the region remains a hot topic on the agenda of industry participants and decision makers looking for the economic development and modernization in order to diversify from natural resources. Globally, we are seeing the first signs of regulatory sandboxes seeking to work together and many new initiatives of public and private institutions to work together. The market is recognizing the power and speed of collaborative approaches in Fintech.

Figure 2. Fintech start-up by MENA Zone country⁴⁵



UAE

The governments of Dubai and Abu Dhabi have focused on ‘smart’ technologies. UAE banks and financial institutions are creating digital platforms and launching electronic innovative solutions. They vary from e-payments, electronic wallet services to robo-advice platforms. It offers computerized and algorithm-driven financial services with little human supervision. The fast uptake of smartphone payment in the UAE in 2018 is remarkable. The Emirates Digital Wallet initiative is a joint project amongst a large number of UAE banks to create a mobile cash wallet available to customers. These projects are likely to hit the market in the near future in this area. The country launched the Fintech Innovation Centre in Abu Dhabi in late 2017. Moreover, the DUBAI INTERNATIONAL FINANCIAL CENTRE “DIFC” continues to support a growing Fintech industry with several firms gaining international funding and introducing products and services to the market. The Dubai Land Department announced in May 2018 the creation of a “Real Estate Self Transaction” platform for digital transactions in land for 2020.

Saudi Arabia

A big chunk of the Saudi government’s Vision 2030 is about digital transformation in Fintech. In February 2018, the Saudi Authority signed a deal with Ripple, a US-based technology company, to help banks in the kingdom settle payments using blockchain technology. Fintech Saudi has been launched, with both the Saudi Arabian Monetary Authority (SAMA) and the Capital Markets Authority (CMA) as partners along with a host of banks, service providers and Fintechs. The CMA also created a Fintech lab and is issuing permits for financial technology experimentation.

Bahrain

Bahrain is actively developing a Fintech industry involving different governmental authorities. First, the central bank entered into MoUs with the Monetary Authority of Singapore and the ADGM to facilitate cooperation on innovation projects. Second, the CBB has introduced a regulatory framework for Fintech and a sandbox for tech firms to test their innovations. It has had success in the crypto-space by hosting one of the first licensed crypto-exchanges. Moreover, the Economic Development Board (EDB) created earlier in 2018 the Bahrain Fintech Bay. According to Rasheed Mohammed Al Maraj, governor of the bank, BCB and BF form together a part of a “strategy towards positioning Bahrain as a regional leader in Fintech”. This Fintech Bay launched the Global Islamic & Sustainable Fintech Center (GISFC) consisting of local, regional and international members with the aim to encourage “sustainable, social and responsible innovation”. Recently the Bahrain Development Bank and Economic Development Board have each announced funds of USD100m to invest in tech start-ups.

Egypt

The Egyptian Government and the Central Bank of Egypt’s (CBE) intention to upgrade payment systems and to get to cashless system is the reason behind the growing number of Fintech start-ups. In April 2018, the first blockchain-focused incubator opened in collaboration with Egyptian firms. CBE issued new regulations for cashless payments using smartphones. But, Fintech start-ups can work in partnership with the banks to provide financial services for banked and unbanked customers. Since Fintech companies act as payment services providers, there was a widespread growth of in online payment gateway services. It is still necessary to adopt e-commerce law and other financial regulatory reforms to respond to the growth in digital credit lending and crowdfunding.

Jordan

The majority of Jordanians does not have bank accounts and use cash to settle their bills and make payments. Fintech in Jordan is in its infancy, but is slowly growing. At firm’s level, they are still implementing systems to settle electronic bills and make payments through smartphones. At Jordanian Government level, it is actively encouraging the introduction of Fintech in various public and private sectors. The CBJ anticipate the rise of Fintech in Jordan and is gradually issuing regulations and instructions for Fintech providers and users. The CBJ partnered with Fintech company Madfoo’atcom launched e-FAWATEER.com in 2015 as an electronic bill presentation and payment system. In order to provide the “unbanked” with access to financial services, the CBJ provide electronic mobile wallet that enables people to pay bills and make person-to-person or person-to-merchant transfers.

Lebanon

Lebanese local banks have introduced Fintech like mobile and online banking, payment and deposit platforms and money transfer platforms which have had a significant impact on the Lebanese financial sector. The Capital Markets Authority (CMA) regulates crowdfunding and CBL regulates electronic banking. In order to obtain a crowdfunding licence, the CMA conducts “Know Your Customer” (KYC) verification. Doing so, it investigates relations between the crowdfunding operation and the underlying

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companies. The CMA canceled the prohibition on promoting or dealing with electronic currencies for their own account or for the account of their clients and on issuing electronic money. BDL (la banque du Liban) prohibits all institutions from providing advice of any kind to the investors or the company and applies to all institutions authorized to carry on securities trading. But, in the last two years, the BDL applied plans allowing the central bank to launch its own digital currency.

Figure 3. Digital readiness⁶
 Source: *Fintech ecosystem playbook (2018)*.

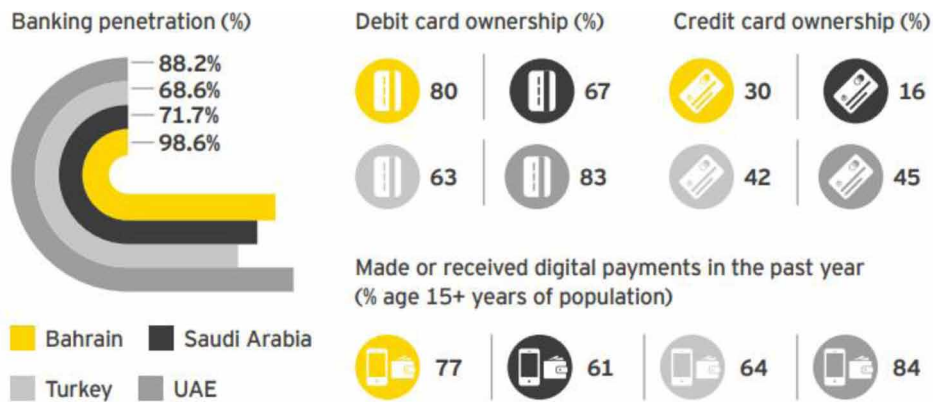
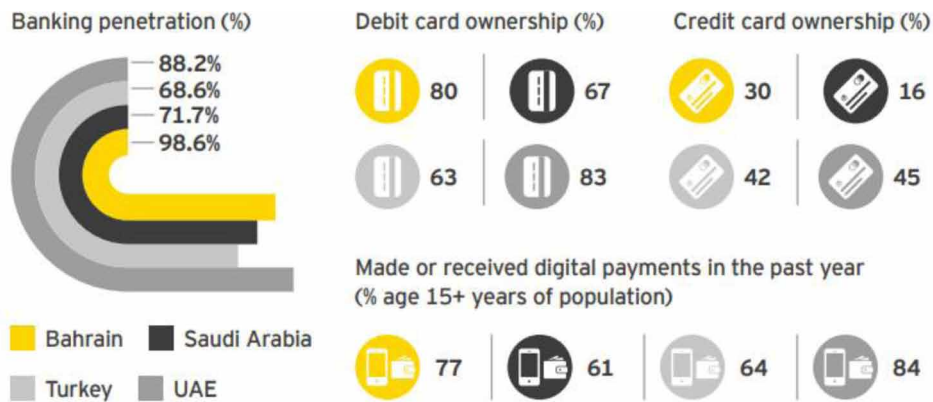


Figure 4. Financial parameters
 Source: *Fintech ecosystem playbook (2018)*.



Kuwait

Before the ET Law (Electronic Transactions) issued by the Kuwaiti national assembly in January 2015, only a small number of Fintech start-ups are operating in Kuwait. This typical law governs electronic contractual agreements and electronic signatures, and covers electronic payments. Under this ET law, electronic payment is an acceptable payment method so long as it complies with the ET Law and the provisions set out by the CBK and an electronic signature is binding and admissible as evidence if it

complies with the provisions of Law. In November 2018, the CBK (central bank of Kuwait) announced the launch of a regulatory sandbox for start-ups. But, this sandbox is not yet implemented.

Oman

The Fintech sector in the Sultanate of Oman is in a continuing development at a slow rhythm due to a lack of consumer awareness and confidence. People in Oman are used to settle their payments and bills with cash at banks or teller machines. Recently, the first Omani Fintech company “Thawani Pay” is established. It is a mobile digital platform. The Omani government announced a blockchain collaboration initiative with the Oman Banks Association in April 2018. Despite the diversified existing laws of Fintech transactions, there is no clear law that provides clear terms of Fintech transaction as it is not expressly covered under the existing laws. In fact, all Fintech transactions are subject to the ETL that governs all forms of electronic transaction. While aspects of Fintech are regulated by these general laws, there is a need for a comprehensive regime which governs Fintech in Oman.

Tunisia

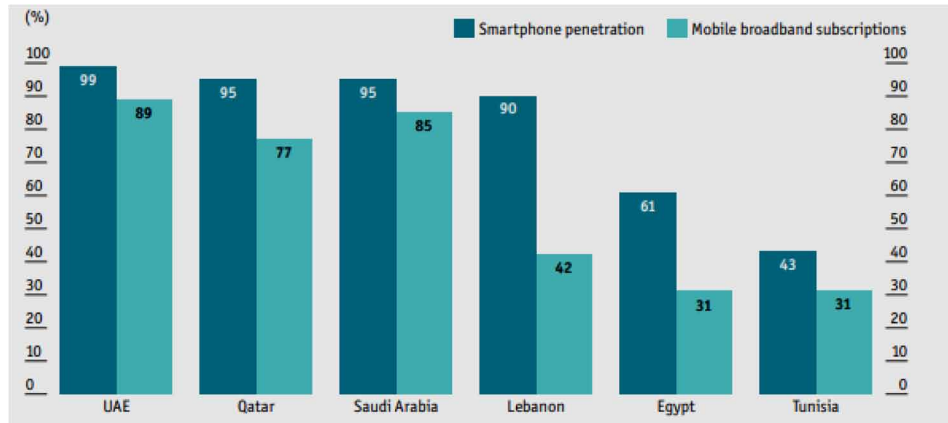
Tunisia is a Greenfield opportunity for Fintech. Mobile payments have revolutionized the financial industry, where more than two thirds of people are subscribed to mobile telephone networks⁷ and 55% are connected to internet⁸, but only around one-quarter⁹ have bank accounts. Some countries like South Africa are among the fastest growing Fintech markets in the world. In Tunisia¹⁰, more than 3/4 of population lives in less than 10% of the territory where 80% of the economic activities take place. Most of the people own a mobile phone and more than the half use internet. The Fintech revolution can reach these people and change the current status of the financial services industry in Tunisia. In fact, the number of valid electronic transaction tripled since 2010 to 2018 and reached above 18557 deals¹¹. Nevertheless, the ecosystem for digitizing content and services is not developed, as projects have often relied only on the public sector’s abilities (E-Culture, E-Education, E-Agriculture, E-etc.). In addition, the ICT budgets allocated to digitization projects are rather low¹². The innovation ecosystem is inefficient and the logistic system is not competitive and is unable to support e-commerce, except the post. Similarly, the new digital regulatory framework is not yet set up (digital code) to replace the current framework (telecommunications code) while the incentive framework for off-shoring is slowly implemented in practice. Moreover, there is a lack of coordination between economic and social departments in the implementation of the National Strategic Plan Tunisia Digital (Industry, Health, etc.) getting to a lower level of ICT integration in companies, health institutions, etc. According to the report of the Ministry of Communication Technologies and the Economy, we note that the added value of digital increased from 45150 in 2014 to 10000 (MDT) in 2018. This increase has a positive effect on the economy. The digital export rises from 950 in 2014 up to 3000 (MDT) in 2018 and the number of jobs in the digital sector from 2.5% to 20%¹³.

We can conclude that digital banking, cryptocurrencies, ecommerce and Fintech start-ups knew recently record years for digital investments in the MENA region. But there’s wide variation between countries.

Figure 5. Smartphone penetration and mobile broadband subscriptions by country¹⁴

Base: National only; n=4,529.

Source: Mobile Broadband Subscriptions - World Economic Forum (2015), Network readiness index.



DATA AND STUDY METHODOLOGY

In this chapter, we use data from Datastream, data bank platform as representative of Fintech concerning MENA Zone countries during 2011, 2014 and 2017. Our choice is explained by the fact that emerging countries especially Arab ones are Greenfield opportunity for the expansion of financial technologies. To approximate Fintech, we use Mobile Money, Digital Payment, Debit card and Regulatory quality. We study Fintech's impact on macroeconomic variables such as inflation rate and unemployment rate (Broby 2017, Deloitte 2017, Gomber et al 2018, Nicoletti 2017, Pejkovska 2018, Alvarez and Lippi, 2017 and Tavne and Suri, 2017) and investment and financial freedom, etc. We also use the World Bank's governance indicators to assess the quality of the Arab institutional framework such as political instability, corruption, and government effectiveness, rule of law and voice and accountability as contingency factors explaining the probable effect of Fintech on a country's economy. The table below presents all variables measures used in our study. Based on a multiple regression model to estimate, the study uses the ordinary least squares (MLS) technique. Political risk variables were used as indices or percentages. The multiple regression models for estimating the main effects of the Fintech have the following form:

$$Y_i = \beta_0 + \beta_{i1}FINTECH_i + \beta_{i2}CV_i + \varepsilon$$

Where;

β_0 : is the intercept or constant amount

β_{i1} : are coefficients of the explanatory variables

β_{i2} : are coefficients of the control variables

ε : stands for the error term

Table 2 reports the variables indications and measurements used in this research.

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Table 2. Presentation of variables

Variables	Indication	Measure
Annual inflation rate	INFLATION	The percentage of annual inflation.
Bank account	ACCOUNT	The percentage of respondents who report having an account at a bank or another type of financial institution or report personally using a mobile money service in the .past 12 months (see definition for mobile money account).
Debit card ownership		The percentage of respondents who report having a debit card.
Digital payment	DIGITAL PAIEMENT	The percentage of respondents who report using mobile money, a debit or credit card, or a mobile phone to make a payment from an account, or report using the internet to pay bills or to buy something online, in the past 12 months. It also includes respondents who report paying bills, sending or receiving remittances, receiving payments for agricultural products, receiving government transfers, receiving wages, or receiving a public sector pension directly from or into a financial institution account or through a mobile money account in the past 12 months
Regulatory quality	REGULATORY	Regulatory Quality captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development. Estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution, i.e. ranging from approximately -2.5 to 2.5.
Unemployment rate	UNEMPLOYMENT	The percentage of annual unemployment.
Voice and Accountability	VOICE	Voice and Accountability captures perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media. Estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution, i.e. ranging from approximately -2.5 to 2.5.
The freedom if investment	Investment Freedom	The business freedom component measures the extent to which the regulatory and infrastructure environments constrain the efficient operation of businesses. The quantitative score is derived from an array of factors that affect the ease of starting, operating, closing a business
The freedom if finance	Financial Freedom	Financial freedom is a measure of banking efficiency as well as a measure of independence from government control and interference in the financial sector. State ownership of banks and other financial institutions such as insurers and capital markets reduces competition and generally lowers the level of available services
Social revolution	REVOLUTION	A dummy variable that capture the existence of a social revolution.
POLITICAL INSTABILITY	INSTABILITY	Political Stability and Absence of Violence/Terrorism measures perceptions of the likelihood of political instability and/or politically-motivated violence, including terrorism. Percentile rank indicates the country's rank among all countries covered by the aggregate indicator, with 0 corresponding to lowest rank, and 100 to highest rank. Percentile ranks have been adjusted to correct for changes over time in the composition of the countries covered by the WGI.
Gross domestic production	GDP	The logarithm of gross domestic production per capital.

EMPIRICAL RESULTS

The impact of Fintech on Inflation

Before analyzing the relationship between Fintech and inflation, we admit that FinTechs are disruptive and are not free of risk. These technologies offer financial services to customers using technology-integrated business models more effectively and convenient than traditional ones. In fact,

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the potential impact of mobile money on inflation has been addressed for the first time by Simpasa and Gurara (2012), who argued that the increase in monetary speed could spread inflation, thus complicating the implementation of monetary policy. According to Aron and Sebudde (2015), forecasting the relationship between mobile money and inflation is difficult in emerging markets, where trade and monetary regimes have changed and foreign exchange prices, energy and food prices are highly volatile. Our empirical results show that Mobile Money approximated by Debit Card and Digital payment through mobile phone does significantly increase Inflation in MENA zone countries, as illustrated in Table 3.

Table 3. Effect of Fintech on inflation (Empirical results of the OLS regression)

Inflation	Coef.	Std. Err.	t	P> t	[95% Conf.	Interval]
ACCOUNT	-1.035978***	0.2463666	-4.21	0.000	-1.54338	-0.5285765
DEBIT CARD	0.5704459**	0.251695	2.27	0.032	0.0520702	1.088822
DIGITAL PAIEMENT	0.4063905**	0.1656345	2.45	0.021	0.0652598	0.7475211
REGULATORY * DIGITAL PAIEMENT	-0.3127777*	0.1548258	-2.02	0.054	-0.6316473	0.006092
cons	135.8908***	7.207181	18.85	0	121.0473	150.7343
F(P-value)	5.98 (0.0016)					
R-squared	0.4888					

Notes: * P<0.1,** p < 0.05, *** p < 0.01

This result is convergent with several previous empirical studies, Simpasa et al. (2011), Mas and Klein (2012), Mehrotra and Yetman (2014), Aron et al. (2015) and Tavneet Suri (2017). The widespread use of credit cards promotes the efficiency of transactions but results in inflation in the absence of monetary intervention. In case of default on credit cards, there is still more inflation and less efficiency gains, Geanakoplos, (2010) and Alvarez and Lippi (2017). On the other hand, Zhang et al, (2013) postulates that mobile money can affect interest rates as it leads to the creation of credit by commercial banks. The role of mobile money in credit creation has been studied by Nampewo et al (2016), who emphasize the crucial role of savings and deposit mobilization. This author has asserted in his hypothesis that if mobile money leads to economic efficiency through a reduction in transaction costs and a better allocation of resources and credit, it follows that the overall economic activity will be supported. In fact, our findings just support previous academic results suggesting the importance of the effectiveness of authorities and decision-makers. We interestingly empirically prove that the ability of the government to formulate and implement sound policies and regulations significantly permit to promote development through inflation reduction. In this regard, Narayan and Sahminan (2018) argue that FinTech is able to reduce inflation since these innovative solutions bring down costs and improve the quality of financial services. Ondabu et al. (2015) analyze the relationship between effective inflation control and mobile money and found that mobile money service can be an inflation control tool that allows central banks to control inflation. These authors proposed recommendations on mobile money transfer and effective inflation control as the use of carefully crafted policies and procedures to maintain client satisfaction.

Our result is very important since it takes into consideration the moderating effect of social factors. Empirical results of several regressions show that, as expected, in the context of regulation, approximated by the ability of the government to formulate and implement sound policies and regulations that permit

and promote private sector development, inflation significantly decreases. As we present below, there are many studies concerning the relationship between Fintech and economic indicator but this research is the first according to our knowledge to integrate social factors.

Tavneet Suri (2017) argued that mobile money systems could accelerate the speed of the currency and inflation. They also facilitate trade, remittances and transactions in US dollars. On the other hand, Mas and Klein (2012) confirm that the speed of money increases in a normal way is above all the electronic money which is based on a safe model. In this sense, Aron et al. (2015) and Simpasa et al. (2011) pointed out that mobile money could lead to an increase in the speed of money and therefore the need for regulation to ensure that these products do not undermine the effectiveness of monetary policy. Walker (2016) confirmed that financial innovations help to reduce the incomplete nature of markets, and monetary authorities could usefully move from headline inflation to core inflation. These results encourage policymakers to continue to support and encourage the spread of mobile phones. Even Maweje (2017) argued that the use of mobile money does not lead to high inflationary risks. In this sense, Mehrotra and Yetman (2014) showed the existence of a positive relationship between the financial inclusion and the volatility of inflation. However, since the Fintech share in the economy and financial markets remains small, it's too early to draw a policy implication especially in a fast growing market.

The Impact of Fintech on Unemployment

With existing robotics and artificial learning technologies, about half of all paid activities could be automated. It is clear that significant disappearances and job changes are likely to be observed. It would be better to accept and improve the digital revolution than to ignore it and counter it so the reorganization of the economy around revolutionary technologies is extremely beneficial in the long run.

Since little research exists to find correlation between Fintech and the general economy and society, we rely mostly on economic intuition to choose variables as indicators for social and economic environment. Given that Dietrich & Wernli (2016) and Foo et al. (2017)¹⁵ found that higher unemployment rates were correlated with higher Fintech rates, we include the annual unemployment rate. In our case, we analyze the potential effect of Fintech moderated by social factors on unemployment as a country's welfare measures (see Table 3).

In fact, there are serious pressure related to Fintech, which are not efficiently and sufficiently because they still could have a negative impact on production and productivity. Several studies examined the effect of Fintech on the global economic and social environment. While most of countries attempt to reduce unemployment through Fintech, the hiring rate remains low, especially in the MENA zone countries. Unemployment among young people and holder of higher certificates was the principal reason of social movements in those countries. Therefore, authorities should focus on creating appropriate regulation for Fintech to moderate potential negative effects.

Empirical results reveal that banking account creating and Fintech approximated by digital payment decrease significantly unemployment. This result is relevant since it is in harmony with country's objectives. So, Fintech is a driver of economic growth for MENA zone countries and a breeding ground for innovative projects and jobs. Moreover, we interestingly find that the context of voice and accountability where country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media, unemployment rate significantly decrease. This result suggests the importance of role of the government to formulate and implement sound policies and regulations significantly permit to promote development through job creation.

Table 4. Impact of Fintech on unemployment (Empirical results of the GLS regression)

Unemployment	Coef.	Std. Err.	t	P> t	[95% Conf.	Interval]
CREDIT CARD	-0.0849186	0.0863276	-0.98	0.335	-0.26309	0.0932529
DIGITAL PAYMENT	-0.1143828*	0.0578573	-1.98	0.060	-0.2337944	0.0050289
DIGITAL PAYMEENT *VOICE	-0.1081099**	0.043865	-2.46	0.021	-0.1986427	-0.0175771
ACCOUNT	-0.1377893**	0.0548975	-2.51	0.019	-0.2510921	-0.0244865
GDP	0.1635161	0.6087936	0.27	0.791	-1.092972	1.420004
_cons	17.40928***	1.658756	10.5	0.000	13.98578	20.83278
F(P-value)	9.99(0.000)					
R-squared	0.6754					

Notes: * P<0.1,** p < 0.05, *** p < 0.01

THE IMPACT OF FINTECH ON INVESTMENT AND FINANCIAL FREEDOM

Recent years were good vintage for fintech. Globally, 2018 marks a record for investments in fintech, which reached \$ 27.5¹⁶ billion in the first six months, notably thanks to Asia. However, while Fintech investment in Mena zone is building fast, it remains modest compared to other parts of the world, especially as mentioned in Asia. In fact, according to the Magnitt report, a Dubai-based entrepreneurs' network, last year was a record with 366 deals, attracting \$893 million in investment. Of all deals in the region, digital startups account for 12% followed by e-commerce. Almost absent few years ago, MENA fintech is now a \$2 billion market. The Beirut-based consultants MENA Research Partners expect annual growth to reach \$125 million by 2022 with more new firms launching every year¹⁷.

A regulatory approach to financial technology should assure that consumers and investors are safe from fraud and the state can fight against tax evasion, money laundering and terrorist financing while ensuring that those risks are well understood and managed. When developing a regulatory framework decision-makers should look to the future while being more creative and flexible. According to Gomber and al (2018), Fintech has begun to attract significant investments, which are expected to increase in the future as more technologies are deployed in the financial services business. Many positive features justify people's willingness to adopt encryption and encrypted currencies, alternative payment solutions, and Fintech investment and banking services. However, there are also threats related to these elements of Fintech, which are rarely addressed but which could have a negative impact on the entire financial services sector. Pejkovska (2018) examined the effect of Fintech on the global financial services sector. The results show that the current regulation of Fintech is inappropriate and could have potential negative effects on the financial sector, such as corruption of cyber security, breach of data privacy and use of Fintech services for illegal purposes. Therefore, authorities should focus on creating appropriate regulation for Fintech to mitigate potential negative effects. That's why Nicoletti (2017) argue that financial technology companies do not yet have to establish themselves as a force of influence in the financial services sector.

In our case, empirical results on MENA zone countries highlights interesting findings. We show that Digital Payment and Credit Card, as Fintech's proxy, significantly increase investment and financial freedom while it significantly decreases when we consider Political Instability (see Table 4). This result is expected since in case of political stability decision-makers do not opt for innovative technologies

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and protect the interests of economic lobbies. This is the case of several Arab countries. This is clear for dictators ones and could be explained by the long duration of democratic transition steps. On the other hand, and in line with our findings, we interestingly find that revolution in MENA zone countries do positively and significantly affect both investment and financial freedom. Indeed, after revolution country's citizens participate in selecting their government and then get freedom of expression in all sectors including financial and investment ones. Technology enabled lending platforms could enhance the resilience and stability of credit in the financial system and contain liquidity risks in the economy to pure liquidity shocks, provided that: (i) investors are educated with an understanding that such networks are not direct providers of liquidity, and (ii) that the end investors are not traditional banks. Fintech platforms are currently less exposed to system-wide shocks compared to traditional banks since on aggregate and by scale they are more domestically driven in their operations. Large exogenous shocks and spill-over effects might be further moderated by the degree of low system interconnectedness compared to banks. Yet, this degree of low connection may potentially gradually decline as Fintechs become more interconnected with banks (FSB, 2018). This is an aspect for competition and regulatory authorities to consider further.

Table 5. Impact of Fintech on Investment and financial freedom (Empirical results of the GLS regression)

	Investment Freedom			Financial Freedom		
	Coef.	T	P> t	Coef.	T	P> t
REVOLUTION	17.68951	2.42	0.024	14.29646	2.14	0.043
DIGITAL PAYMENT * POLITICAL STABILITY	-0.199481	-1.93	0.066	-0.2388399	-2.53	0.019
CREDIT CARD	0.2995667	1.14	0.265	0.4785135	2	0.057
DIGITAL PAYMENT	0.2489989	1.68	0.106	0.071741	0.53	0.601
GDP	-2.11135	-0.85	0.404	-1.49215	-0.66	0.516
_cons	33.79442	4.21	0	27.94862	3.82	0.001
F(p-value)	3.14(0.000)			11.13(0.000)		
R-squared	0.4198			0.4054		

Notes: * P<0.1, ** p < 0.05, *** p < 0.01

Figure 6 displays the main empirical results of the moderating effect of political stability, regulation and voice on the relationship between Fintech and economic performance.

The moderating effect of political stability, regulation and voice on the relationship between fintech and economic performance.

CONCLUDING REMARKS AND SUGGESTIONS FOR FUTURE RESEARCH

Fintech companies have produced a public market for consumer debt, analogous to the bond market; this market did not exist prior to 2006 and it was largely owed to financial and informational frictions on the part of banks, Balyuk, (2017). Fintechs are a new, fast-growing part of the financial services domain,

freedom by attracting investments. But, while social revolution is an improving factor, political stability is negatively correlated with increase investment and financial freedom. This result could be explained by the fact that decision-makers do not opt for innovative technologies and want to protect the interests of economic lobbies. This is the case of several countries in MENA zone region where some countries are characterized by dictator political regime and others are in a process of setting up new democratic regimes going through a long transition steps. It would also be interesting to study the degree of correlations and interactions between bank and Fintech activity as evolving companies. In order to extend empirical literature on Fintech, further study is warranted to examine the impact of the maturity of infrastructure like digital platforms to attract Fintechs in emerging countries.

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ENDNOTES

- ¹ Singapore Fintech Festival 2018.
- ² Approximately 3 billion unbanked consumers around the globe could potentially be connected to the financial system.
- ³ CLIFFORD CHANCE, Fintech in Middle East – Developments across MENA, 2018. available for free download at https://www.cliffordchance.com/briefings/2018/12/fintech_in_the_middleeast-developmentsacros.html
- ⁴ Wamda research Lab, 2016.
- ⁵ Fintech Flourishes in MENA: Report by Fintechnews Middle East 6. January 2018
- ⁶ Report of Singapore Association., “FinTech ecosystem playbook”, (2018).
- ⁷ See figure 6.
- ⁸ See figure 7.
- ⁹ There are “8 516 992” bank account in 2016 according to the Tunisian central bank report.

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¹⁰ <https://www.webmanagercenter.com/2018/04/09/418301/taux-durbanisation-70-de-la-population-tunisienne-vit-dans-seulement-10-du-territoire/>

¹¹ See figure 8.

¹² ICTs represent only 0.6% of investments in 2015.

¹³ Note that the digital positioning of Tunisia is advanced; first in Africa and 40th in the world.

¹⁴ The Economist Corporate Network report (2016).

¹⁵ Jessica Foo & Lek-Heng Lim & Ken Sze-Wai Wong, 2017. “Macroeconomics and FinTech: Uncovering Latent Macroeconomic Effects on Peer-to-Peer Lending,” Papers 1710.11283, arXiv.org.

¹⁶ Investments in the first half of 2018 totaled \$ 27.5 billion, exceeding the 2017 total of \$ 20.5 billion, according to a note from the Boston Consulting Group (BCG).

¹⁷ McKinsey Global Institute (2016).

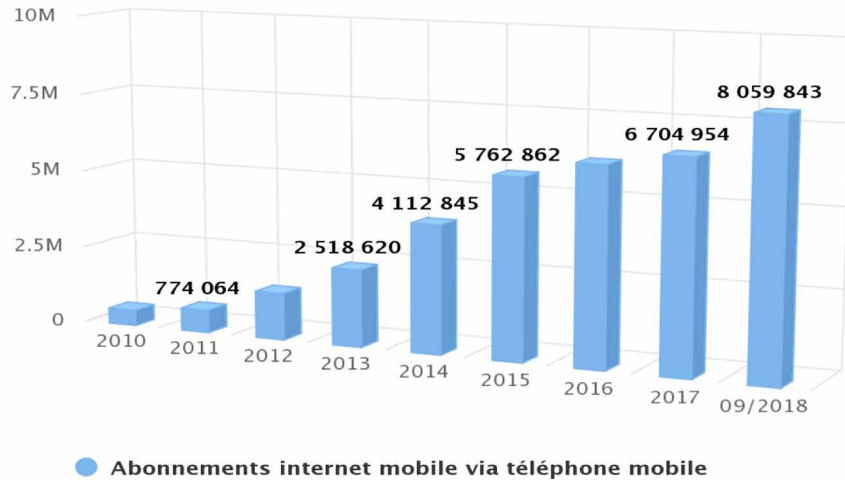
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APPENDIX

Figure 7. Tunisian people subscribed to mobile telephone networks

Abonnements internet mobile via téléphone mobile

Source : MTCEN

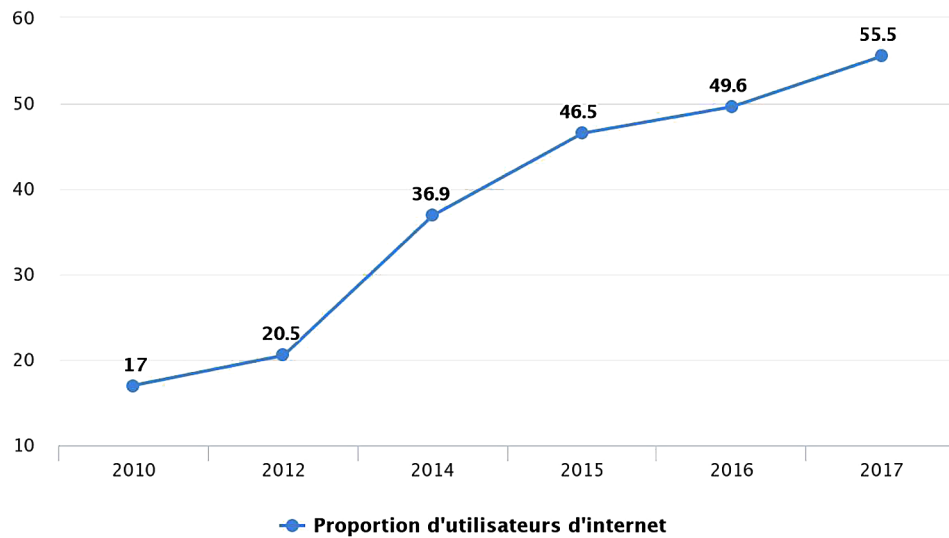


Highcharts.com

Figure 8. Tunisian people using internet

Proportion d'utilisateurs d'internet

Source : INS

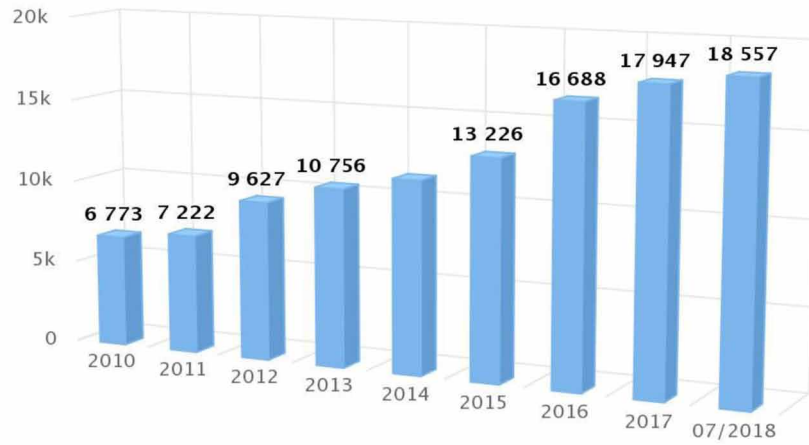


Highcharts.com

Figure 9. Progress of valid electronic transaction (2010-2018)

Nombre de certificats de signature électronique valides

Source : MTCEN



● Nombre de certificats de signature électronique valides

Highcharts.com

Chapter 6

FinTech Strategies in the GCC: Developing a Growing FinTech Ecosystem – A GCC Perspective

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ABSTRACT

The Gulf states, attempting to diversify their economies, have focused largely on transforming their economies. Part of their transformation focus areas is the technology sector. FinTech is a generic term used for all financial technology developments, and has gained a lot of traction in the recent years. As Financial services is one of the main sources of GDP for the GCC states, the GCC governments have focused in promoting the FinTech entrepreneurship spirit, through different initiatives. In the chapter, the authors analyze the FinTech ecosystem development mode for all the GCC countries, focusing on understanding the reason that have made it one of the most successful FinTech ecosystems globally.

INTRODUCTION

The Gulf has long been famous for two things: its oil and the lavish spending on extravagant initiatives made possible by oil windfalls. Yet, in this age when humanity is aligning its efforts to achieve a more balanced (Sustainable Development, n.d.) and sustainable (The Paris Agreement, n.d.) path to growth and systems of production face rapid technology-driven transformation, perhaps unexpectedly, Gulf countries are leading the way.

In the recent years, all the Gulf countries have launched long term plans to transform their economic models to embrace the opportunities created by the 4th Industrial Revolution (Lanteri, 2017), by leveraging, experimenting, and exploiting different emerging technologies. This is a result of the changing economic environment globally, and the associated risks and opportunities. As a result, the gulf countries have been performing quite well on Innovation indices, making them very attractive places to test

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and implement these technologies. Such examples include the Hyperloop, which is supposed to cut the time needed between Dubai and Abu Dhabi in 10 minutes, the use of robots in different companies and departments, and self-driving cars, among others.

While these technologies are successfully deployed across multiple domains, what presently seems their most promising application in the Gulf is in finance (AMP, n.d.). This seems to be aligned with the fact that the GCC countries, apart from oil exporters, are also popular financial hubs. Such success holds precious lessons for the region, highlighting the importance of both a clever strategy and an effective execution.

In order to understand in depth, this chapter is structured in the following sequence: In the following section, we describe the traditional economic structure of the Gulf countries. We then explore further the meaning of fintech, and how it is affecting company operations.

THE TRADITIONAL ECONOMIC STRUCTURE OF THE GULF COUNTRIES

The Gulf Cooperation Council (GCC) is a group of six oil exporting countries – namely Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates. It was formed a regional intergovernmental political and economic union in 1981, with its ultimate aim to expand the economic ties between its members. In 2008 a common market was launched and discussions about the introduction of a single currency were started.

The six countries show similarities in terms of their economy and how they are governed. Specifically, their economies have largely been based in the Oil revenues. This was associated with large government expenditure, with particular focus in the construction and real estate industries. Following the Arab spring, these amounts of money were used to benefit the countries' population, so again there was an increase in the public expenditure.

At the same time however, some of the economies, specifically the UAE and Qatar, have attempted to diversify their economies in more areas. They have done by adopting dedicated policies in specific areas. First of all they have attempted multinationals, in order for them to build their regional headquarters. Furthermore, they have tried to develop specific “niches”, in the aviation, tourism and education industries. As a result, Emirates contributes 10% of the UAE's GDP, while at the same time tourism numbers have been growing with a steady pace the recent years. Concerning education, both the UAE and Qatar have formed partnerships with leading universities, attracting them to relocate to these emirates, while at the same time attracting very large numbers of international students.

In the recent years however, all of the GCC countries have tried to focus on their SME development. In order to do that they have developed long term plans and national policies with specific industry focus. As a result, there have been some SMEs that have been growing very rapidly in the recent years. A particular focus has been on technology and start ups. Specifically, there have been multiple attempts to engage in policies to promote education technology, aviation, oil and gas, and the finance industry, also known as fintech, as all of these industries have been the pillars of these economies. We analyze more in the fintech industry in the following part.

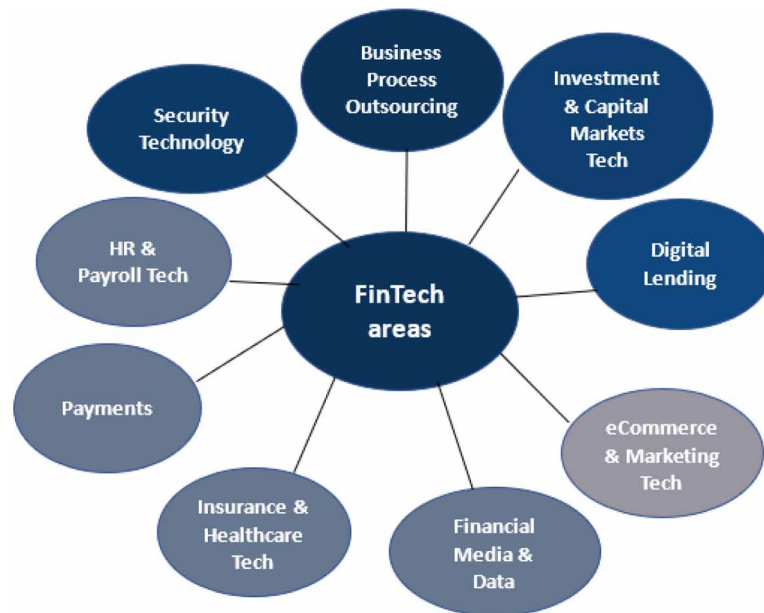
FINTECH: WHY, WHAT, HOW?

As discussed in the previous paragraphs, the regional economies in the GCC countries have attempted to diversify their economies in the recent years. This is mainly by embracing innovation in every industry. However, as the financial services are an important area in terms of GDP contribution of the GCC, there are different approaches that each country has engaged, to develop a FinTech ecosystem. Before describing them in detail, the next paragraphs discuss in depth the FinTech environment.

What Is Fintech, and Its Impact?

The word “fintech” is simply a combination of the words “financial” and “technology”. It describes the use of technology to deliver financial services and products to consumers. FinTech covers a few different areas. These can be seen on diagram 1 below.

Figure 1. The areas of FinTech



This could be in the areas of banking, insurance, investing – anything that relates to finance.

Fintech is changing the world of finance for consumers in a myriad of ways. For example, you can now open a bank account over the internet, without physically visiting a bank.

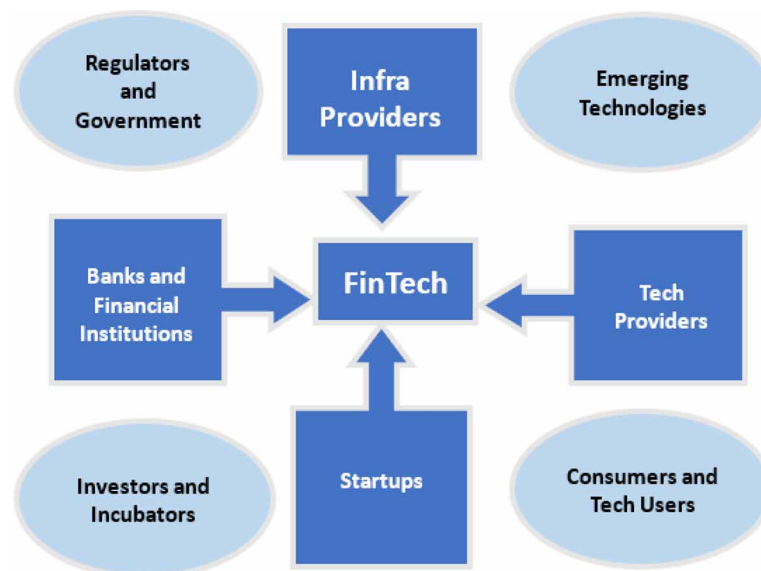
You can link the account to your smartphone and use it to monitor your transactions. You can even turn your smartphone into a “digital wallet” and use it to pay for things using money in your account.

Advances in technology means consumers can also invest over the internet on an “execution only” basis without any face-to-face interaction. In time, you may be able to get automated financial advice or “robo advice” with little or no human interaction.

The FinTech Ecosystem

Together, governments, financial services companies, and FinTech startups form an ecosystem. From an innovation perspective, one's efforts help further another's. Companies see what the other is doing and make similar adjustments to their product offerings. There is also increased acceptance of new technologies, as one's addition of a certain technology helps fuel adoption. Ultimately, FinTech ends up being a very small world. The people with the financial expertise needed to inform FinTech projects and those with the technological abilities to make those suggestions come to life often move between companies, either through mergers, a consulting basis, or employment. Diagram 2 below presents in more details the different stakeholders of the ecosystem.

Figure 2. Caption



Broad FinTech Categories

Mobile Banking

Mobile banking refers to the service that banks and other financial institutions provide to their customers by allowing them to conduct a range of transactions using an app. The app allows the customers to access and transact with their accounts remotely. With mobile banking, you can open a new account; check your balance, transfer funds and pay bills from the comfort of your house. A study conducted in the US in November 2016 revealed that 72 percent of the financial services consumers use digital channels to open checking accounts.

Internet Banking

Also referred to as e-banking or online banking, internet banking is closely related to mobile banking. The difference is that instead of using an app, customers use the web. You may access the web by use of your smartphone, tablet or a PC. All the transactions are conducted through the website of the financial institution. Statista notes that the share of individuals using internet banking in the UK increased from 30 percent in 2007 to 60 percent in 2016, pointing to the increasing popularity of internet banking.

Blockchain

Blockchain refers to a decentralized digital ledger that can record transactions across multiple computers such that the recorded transactions cannot be altered retrospectively. Participants can, therefore, audit and verify the transactions in a simple and cost-effective way. Blockchain is an online platform for digital assets. Bitcoin is the digital currency commonly used in blockchain transactions and it is gaining popularity as more and more people embrace fintech.

Insurtech

Insurtech is the use of financial technology in the insurance industry. Many insurance companies are adopting the use of technology and it is now possible to take an insurance cover without having to physically present yourself to the company. An individual can also file claims online.

Predictive Analytics

Predictive analytics is the use of big data to forecast future occurrences. The fintech sector involves the use of Big Data by finance institutions to determine market trends and future profitability. Established financial institutions such as the Bank of America, Goldman Sachs and Morgan Stanley are currently seeking to make use of the data that they have accumulated over time.

Crowdfunding

Crowdfunding is a rapidly growing fintech sector. Every year, up to \$3 billion is raised on US-based crowdfunding platforms. Entry of early startups in the sector has significantly contributed to its overall growth with 24 percent campaign success rate.

Peer-to-Peer Lending

Peer-to-peer lending is one of the sectors that take the big financial institutions head-on by targeting their most profitable products, i.e. loans. It's no surprise that it attracts the most investors. It's an alternative form of financing that puts individuals and young startups in contact with potential investors. The chances of getting approved for credit is much higher than through banks and provided at a much lower cost. In doing so, it further fuels growth and innovation by giving small businesses much-needed funding to get projects off the ground. It's also one of the sectors that produces the most unicorns (\$1 billion startups), including Lufax, LendingClub, ComonBond, Prosper, Funding Circle and Jimubox, to name a few.

Smart Finance Management

The advancement in fintech makes personal finance management easier to all irrespective of their academic background. Apps are capable of managing accounts, automatic budgeting, asset management and finance planning. Mint.com provides one app that performs all these functions.

Innovative Payments

Innovative payments are an important fintech sector especially in the light of increasing globalization and e-Commerce. It is predicted that by 2019, over 5 billion people will be making digital payments.

Robo-Advisors

Robo-advisors are software that uses algorithms to help people make informed investment decisions. Robo-advisors are gaining prominence in the financial industry particularly in portfolio management and stock markets where they make trading intuitive, cheap and mobile. Prominent examples include Wealth front and Betterment.

Remittances

The global remittance market is worth \$530 billion annually.

With today's ever-increasing globalization, more and more people process gross border transfers on a regular basis. This is more prominent in developing countries where global remittance increased by 51% between 2007 and 2016.

The problem is that traditionally, it's incredibly expensive to make an international transfer. In Southern Africa, it costs on average close to 15% of the total transfer amount.

This means that disruption in the remittance sector is especially important, making it viable for people to send large or small amounts of money around the world at a fraction of the cost.

One of the biggest FinTech remittance companies is TransferWise. \$500 million is moved through the platform every month and the company recently raised a further \$280 million in funding, pushing the company value to \$1.6 billion.

Mobile Wallet

Mobile wallets could be seen as a sub-section of the payments sector as it not only provides a safe place to store your money but also offer seamless payment solutions.

Between 50% and 70% of people in developing countries do not have access to traditional financial services, like a bank, while around 80% of individuals do own a mobile phone.

Due to the huge opportunities for FinTech startups to make a real difference in the lives of the unbanked individuals around the globe, the sector attracts around 10% of total FinTech investments. Some of the most successful startups include Mozido and Dwolla. The sector is so lucrative that big tech companies have developed their own wallets, such as Apple (Apple Pay), Google (Google Wallet) and Samsung (Samsung Pay). It is also seen as the birthplace of FinTech, with PayPal one of the first ever platforms to leverage technology in order to disrupt traditional financial services.

IMPACT OF FINTECH IN BANKING IN THE GCC

As mentioned, innovation and financial technology have impact in different areas of organizations.

The rise of the smartphone has massively changed the behavior of consumers. Whether it's checking to pay for goods online or making bank transfer via a mobile app, customers are now getting used to handling financial affairs as easily and conveniently as they do their email or Facebook page.

Banking

FinTech is the major cause of all the recent disruptions we are experiencing in the banking sector today, with the UAE having the highest number of digital banks in the world. Emirates can access top-notch financial services without stepping into a bank.

Fintech uses technology in a better way to make people feel convenient living in the modern age. FinTech helps people who are 'unbanked' but a desire to buy or sell online have access to quick and affordable banking operations just by using a mobile phone.

Lending

FinTech has fueled the growth of alternative lenders which offer both higher yields to investors and faster, cheaper, more convenient loans for borrowers compared to traditional banks.

Private lenders like Beehive, Sarwa,, PayLater, QuickCheck, and Lidya are continuing to plow hundreds of millions of dirhams into alternative-lending space in the GCC states making it easy for anyone to access quick loans (business or personal) when needed.

Financial Management

FinTech is changing the way we manage our money for the better. FinTech startups are introducing simple ways to manage and track your finances.

Instead of relying on a pen and paper or spreadsheet, you can now use digital financial solutions to manage your finances in real time. Good examples of Nigerian startups playing in this space are Payit for saving, Bayzat for invoicing and Souqalmal for expense management.

Payments

As per the PwC FinTech Global Report, 60 percent of all survey responders highlighted payments as the most likely sector to be disrupted by FinTech due to the introduction of cash-less payments such as Apple Pay and Bitcoin.

The GCC payments landscape has significantly evolved over the past decade. The cost of integrating online payments to a website 5 years ago was over 150k now thanks to FinTech, the cost of accepting online payments is Zero.

With the rapid adaptation of card payments in Nigeria, platforms like Paytabs are playing the lead role in making it easy for businesses to start accepting online payments with the click of a button.

KYC and Security

There is an increasing demand for Know Your Customer (KYC) solutions to support the prevention of money laundering and fraud. Presently, KYC operations need to adopt new technology to cut costs, reduce labor time, and efficiently adapt to regulatory changes. The cost of non-compliance is apparent as the Governor of the Bank of England Mark Carney highlighted that the cost of global banks' misconduct reached more than \$320 billion.⁶ Therefore, financial institutions are starting to adapt FinTech verticals, such as AI, to support KYC guidelines.

DIFFERENT APPROACHES ON DEVELOPING A FINTECH ECOSYSTEM WITHIN THE GCC

As mentioned, all GCC countries have recognized the need for transformation, with one of their priorities being the development of the FinTech industry. In the following paragraphs we discuss in more depth how each country is competing in this space.

UAE

Country Approach

The UAE have been pioneer in being the first country that has diversified successfully its economic model with only 1% of its revenue coming from oil, which isn't the case for other countries. This has been achieved through a series of activities. First of all, both Abu Dhabi and Dubai have pushed for the creation of multiple accelerators. The operation of these accelerators along with invitations to large regional corporates permits for real time innovation. This is then exacerbated with the availability of funding from start ups from different networks. The successful alignment of different stakeholders has resulted to multiple success stories.

Success Story One: Blockchain

A good example of UAE's execution muscle is the articulation of its 2021 Blockchain Strategy (Government, n.d.) aimed at becoming the first blockchain-powered government in the world. It was directly implemented in targeted government areas, with specific KPI's. Specific initiatives include: urban planning, digital currency, digitalisation of government records through blockchain, and transaction processing. To drive the strategy, a blockchain council was established with regional and global subject matter experts, with a range of different specialisations. This approach has already resulted in several viable plans with realistic expectations, enabling a constantly improvement in blockchain implementation in different government areas.

One of the earliest success stories is DubaiPay (Das, 2018). The app processed \$35 million of payments in 2017, which was its first year of operations. The government now aims to have more than 50% of its transactions on blockchain software. Other similar examples are now flourishing across different government departments and partner private institutions [*is this true?*]. The Dubai Electricity and Water Authority and the Human Development Authority also embraced DubaiPay and are now moving to the

decentralised ledger to process their transactions, and have already processed more than five million transactions in the first six months of application. The Roads and Transport Authority is testing a vehicle management system. The bank Emirates NBD is piloting a fraud detection software and many other use cases are being developed across the country.

These examples also illustrate the power of creativity under the discipline imposed by a clear vision and a rigorous execution framework.

Success Story Two: Fintech Acceleration

Another illustration of UAE's approach is the development of its fintech acceleration ecosystem. The government established two acceleration programs focused on fintech, each under the supervision of one of the two main financial authorities of the country: Abu Dhabi Global Market (ADGM, n.d.) and Dubai International Financial Center (Webdesign, n.d.). These authorities took a pragmatic approach to deciding the fintech themes for their accelerators. They had to be aligned with the government's targets to support growth in other sectors. So, each summoned the financial institutions under their authority and asked them to identify the main issues they encountered. They then invited fintech startups that addressed exactly those problems. Specifically, they focused on attracting FinTech start ups that are their very early phases (pre series A), based in the world's FinTech hubs, as these were indicated from the WEF. Ultimately this would help the accelerator bring intellectual capital and knowledge, from company that are ready to offer their product, and they only needed local market access.

This pragmatic approach fast-tracked the acceleration programs. Having direct access to the main financial institutions of the country, and under the auspices of the main financial authorities, fintech startups can immediately test their prototyped solutions. Furthermore, since the accelerator focuses on existing issues, as soon as they graduate from the program, startups can offer their services to address the existing demand of a clearly defined market. This is highlighted from the success that some of the start up companies of the accelerator have had. Sarwa, for example, that focused on offering Robo-advisory services, was among the companies that successfully graduated, and were able to secure funding up to 2 million, to further expand in the region. Another interesting case is Norblock, which is a start up focusing on implementing KYC through Blockchain. Following the accelerator, the start up got access to multiple large regional banks, and other major European banks, having a very accelerated product testing, helping them be ahead of any competitor within this space.

As the UAE decided to differentiate its sources of income beyond oil, it established a clear vision (Vision, 2021) and a corresponding country strategy that pursues multiple growth drivers and with a strong focus on building and enabling a digital infrastructure. This vision also offers a broad umbrella policy framework with two distinguishing features that make it stand out with respect to similar visions in neighbouring countries. Vision 2021 was designed with an emphasis on implementation, through a framework of coherent and aligned strategies, ensuring that each decision follows a clear plan and is clearly aligned with the final outcomes of the vision. While fintech is a broad concept that spans from insurance to financial literacy and from wealth management to payments, the UAE took a selective approach to support only the initiatives aligned with the goals of Vision 2021. The combination of execution muscle and disciplined creativity resulted in a coherent overall strategy with specific and yearly measurable milestones to ensure constant progress towards the ultimate goal. At least two compelling success stories illustrate this well.

Bahrain

Country Approach

Bahrain was a regional success story before the UAE take the lead. As a result, they have a more mature financial ecosystem. Its relatively smaller size, also allows for an ease of adaptation to changes. Despite its early entry in the market however and its size, the protests of 2011 resulted on Bahrain losing a few of the companies located there. Despite these changes, the country has been able to successfully adopt a strong FinTech approach.

Success Story One: Credit Scoring

Bahrain, assisted perhaps from its smaller size, is the only country in the GCC that has available a full credit scoring for all the Kingdoms entities available online for free. This is a distinctive advantage, given ie the very large number of credit frauds that happen in the region. The vision of the countrys' leader enabled them to start very early the work on building a strong data infrastructure. This was followed by a very strong execution muscle, where all the companies of the country were forced to behave according to the required reporting standards. As a result, the country has build a very strong and transparent credit database, resulting in market transparency and a more attractive investment environment

Success Story Two: FinTech Bay

In a similar with the UAE, FinTech Bay is a government run accelerator from Bahrain's main financial authority. The impact of this accelerator program has been profound, as it has engaged all the ecosystem to work with international startups. As a result, there has been much adoption of innovation, compared to other regional economies. Furthermore, FinTech Bay has successfully established multiple global partnerships for knowledge, while having also enhanced innovative banking partnerships, such as the KFH, Al Baraka and Bahrain Development Bank partnership to have a common desk for FinTech research and adoption.

Saudi Arabia

Saudi Arabia is the regional giant, dominating the regional economy for more than 50 years. The main source of income traditionally has been Oil revenues. This has resulted in an economy that has largely ignored technology, who was the slowest mover in the FinTech space from its neighbors. Its size however (30 million, making it equal to the population of all the other GCC countries) makes it a very attractive investment environment. Because of its potential, it has had some quick wins with a large impact.

Success Story One: Ripple Blockchain Partnership

Ripple is one of the most successful digital currencies. Saudi Arabia Monetary Authority (SAMA), one of the oldest financial institutions in the region is responsible for the monetary policy within Saudi. Recognizing the potential of digital currencies, the authority decided to partner with Ethernet, in order to ensure efficient currency adoption in the future. This has received world wide recognition, and the work

towards 2020 plan has already started. Following the success of the pilot, the oldest and largest bank of the country (National Commercial Bank) was then able to test and fully implement this technology, in order to capture the very large remittance market that exists in Saudi.

Success Story Two: Paytabs

Paytabs is a payments start up from Saudi. Despite its relatively delayed launch, compared to other payment providers, it has captured a big market share within Saudi, and keep growing. In addition, it has started expanding internationally. At the same time, the company acts as a regional fintech success story, working on further enhancing the regional ecosystem.

Qatar

Qatar's economy is one of the richest economies in the world based on GDP per capita, ranking between fifth and seventh on world rankings for 2015 and 2016. Petroleum and natural gas are the cornerstones of Qatar's economy and account for more than 70% of total government revenue, more than 60% of gross domestic product, and roughly 85% of export earnings. Qatar has the world's third largest proven natural gas reserve and is the second-largest exporter of natural gas.

The country has followed a somehow similar policy to the rest GCC countries, on that it is using a lot its public companies and authorities to implement its policies. One of its main differences however is the way it has leveraged partnerships. Following their successful implementation of the education industry partnerships, which has resulted in some of the largest universities to be based in Qatar, they are now trying to implement this paradigm in the FinTech industry. This has resulted in multiple large scale strategic partnerships, which are discussed in the following paragraphs.

Success Story One: Knowledge Exchange

The country, despite its small size, has performed best in leveraging their 'partnerships' capability. Among others they have partnered with B-Hive, which is an EU knowledge exchange platform. This has enabled them to leverage large scale innovation to build a major fintech hub. Keeping on mind that Qatar is home to the biggest regional bank in terms of assets (Qatar National Bank), the scalable benefiting that partnerships can have is clear.

Success Story Two: International Partnerships

Qatar is the only country that has established strategic fintech partnerships with other countries within the region. Specifically, they have signed strategic alliance agreement with France, on Paris EUROPLACE and Finance Innovation, to support the growth of Qatar's booming digital industry. Paris EUROPLACE is responsible for promoting and developing the Paris financial marketplace. Finance Innovation was launched by the French Ministry for the Economy and Finance in 2007 to stimulate the Paris financial centre, and encompasses 480 member organisations and companies. By establishing these unique partnerships, Qatar has been able to form some of the largest knowledge networks, where people and organization from the private and the public sector collaborate through an online international platform. This has resulted in an alternative way of Innovation Engagement and has benefits at scale for the country.

RECOMMENDATIONS

Young Is Better

As a young region, the GCC has relatively little established legal and financial infrastructures. While this can be a limiting factor for fintech startups, forward-looking and supportive government policies have proved capable of overcoming these limits. Besides, having few established infrastructures allows the government to introduce and implement change more easily. So, our expectation is that the UAE will not only emerge as a leader in the development and deployment of the new technologies that drive the 4th Industrial Revolution. It will also emerge as an innovator in the policy frameworks that make such technologies possible and their applications successful.

Execution Matters Mostly

As mentioned during the text, all of the GCC countries have actually followed a similar path, on their growth choices. Specifically, all of them have more or less developed based in oil money, which has then be channeled to other areas. However, by observing the overall 30 years of growth, it can be safely said that what matters mostly is execution. Specifically, all of the countries have adopted different SME policies and national plans. What we can see however is that only a couple of them have really followed them. So the conclusion we can safely draw is that Execution Muscle is one of the most critical success factors.

Importance of Being “Open”

Another critical factor that can explain the difference performance of economies is their “openness” to partnership, knowledge exchange, and for the international attraction of multination companies. Being “open” is particularly important, as it attracts international companies to be headquartered in the country. Furthermore, this is also beneficial for knowledge exchange, as it can be seen in the case of Qatar.

CONCLUSION

The world is in constant change. And so do the GCC economies. Given the traditional structure of their economies, and the relatively ‘safe’ oil income that dominated their economies over the years, the predictions from economists over the future economies wasn’t clear.

All of the countries however have engaged successfully in their digital transformation trips. As mentioned in this chapter, all of the GCC countries have exhibited a particularly successful execution muscle. This is combined from the available resources to create an enabling infrastructure. The regulators have been pivotal in driving FinTech engagement in the region, while they have been pushing for ‘disciplined creativity’. As a result, the fintech industry in the GCC is expected to attract more than 2 billion investment in the next few years, while at the same time making their digital transformation journey a paradigm within emerging economies.

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Chapter 7

FinTech in the Saudi Context: Implications for the Industry and Skills Development

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ABSTRACT

With the constant development in FinTech globally, Saudi Arabia is a late arrival in the FinTech world. However, the FinTech growth pace in Saudi is fast and not slowing down. This fast pace is confusing stakeholders, including bankers. This chapter unpacks how FinTech is developing in Saudi Arabia, considers the challenges and opportunities that FinTech may be facing in Saudi, and discusses how these changes may affect current bankers and how future bankers can be ready to enter the new market. The study draws on interviews with professionals in the banking and FinTech industries and makes two contributions: It suggests that FinTech is affecting retail and long-tail clients of banks (i.e., the effect on core banking operations, such as corporate banking and treasury). Findings also highlight that professionals should upgrade their knowledge around matters necessary to retain their jobs in the sector. The study has implications for future bankers (i.e., university students), suggesting that university curricula should be updated to include relevant knowledge and professional placements.

INTRODUCTION

In an increasingly digitalized world, this chapter aims to explore the effects of digitalization on the set of skills of professionals, with an emphasis on adapting to such changes and preparing students to the changing market. While digitalization is impacting numerous industries—e.g. travel, music, media, (Mitchell, Gottfried, & Matsa, 2015, Bearne, 2016 & Gaskell, 2017)—the authors here study digitalization in the financial sector by focusing on an under-explored empirical context, that of FinTech in Saudi Arabia.

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This study is premised on the importance of the banking system in any given economy and the size of the Saudi economy in the region. Unlike FinTech in other contexts, the FinTech market in Saudi Arabia is different as the regulators push and give incentives to investors to innovate in this area by supporting business incubators and offering support packages to startups. This way, the regulators develop regulation in parallel to the development of FinTech services. Such packages include waivers on licensing fees and municipality fees among others. The authors adopt a qualitative case study approach involving two groups of participants (bankers and FinTech professionals) in order to develop an in-depth understanding of the phenomenon under study. Further to informing the extant literature, the chapter offers recommendations for academics, researchers, practitioners, students and universities. In what follows, the chapter begins with a literature review, which is followed by a presentation of the research study, and subsequently, a discussion of the study's findings and implications.

BACKGROUND

In this section, the authors review and explain what is currently known in the digitalization field and how it is disrupting different industries; discuss the relationship between digitalization and the financial sector (FinTech); and examine the relationship between education and technology. By doing so, they provide a broader view of why digitalization is seen as disruptive and revolutionary, how it affects the financial industry and in what sense, and explore how education is coping with such changes.

Digitalization and Digital Disruption

Digitalization is the action of integrating technologies into daily processes (Thomas, Srihari, & Kaur, 2015) and is evident in numerous industries; for example, we have seen how newspapers started offering e-versions of their content in addition to the regular printings. Digitalization is also evident in the travel agencies, with some businesses adopting online bookings, others failing to do so and eventually going out of business, and also with new, born-global businesses emerging (Thakran & Verma, 2013).

Digital disruption, however, is the disturbance of the value of existing products and services caused by new technologies that introduce new business modules (Weill & Woerner, 2015). For instance, social media, such as Facebook and Twitter, have affected the news industry by disseminating news on their own multiplayer digital platforms (Newman, 2011). In the travel industry, unprecedented digital businesses, such as Airbnb, are disrupting travel operations worldwide by offering cheaper, customizable and more convenient accommodation solutions (Thakran & Verma, 2013). These examples support Gomber, Koch, & Siering's (2017) view that digital disruption—seen as something that happens over time (Karimi & Walter, 2015)—is using technology to offer a new product/service range to an existing market.

Barnatt (2001) makes a distinction between the first and the second digital revolutions; in his own words, "... *the First Digital Revolution is argued to have 2 been characterized largely by mass digitization, as more and more media, products and services were pushed into a binary, electronic format. In contrast, The Second Digital Revolution is distinguished by mass atomization — or, in other words, the everyday pulling of electronic, digital content into the perceptibly real world*" (p.2). Digital disruption is striking many industries, in transportation, where, for example, carsharing platforms such as Uber and Lyft are taking a large market share from taxis (Gaskell, 2017). The aforementioned author argues that although regular taxi income fell by 10%, the number of self-employed drivers grew by 50%. In

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the news industry, Twitter and Facebook are now the main players especially for younger parts of the population, i.e. the millennials (Mitchell, Gottfried, & Matsa, 2015). In tourism, online travel agencies such as Expedia and Kayak are taking over large market share from the traditional agency offices (Bearne, 2016). The music industry, apps such as Spotify and Soundcloud offer free streaming as well as subscriptions, are taking over the traditional album purchasing and are also pushing music labels out of the picture (Velasco, 2018).

Digitalizing the Financial Sector

Focusing more on the financial sector, banks have been undergoing internal digital transformation, e.g. by adopting new digital technologies themselves (Arner, Barberis, & Buckley, 2015). According to these authors' breakdown of FinTech (Table 1), technology companies were not initially envisioned to compete with the banking sector; this only began after the 2008 crisis. Some examples of such technology companies include: Bankers' Automated Clearing Services (BACS); Clearing House Interbank Payments System (CHIPS); and Society of Worldwide Interbank Financial Telecommunications (SWIFT), all of which were established between 1968 and 1973. Also, Internet banking (e-banking) was introduced to the banking systems by banks themselves (not non-banking companies attempting to disrupt the financial industry), where banks and IT solution companies worked together to create e-banking platforms. However, with the slowdown in the global economy that happened in 2008 and the decreasing trust in the banking system, FinTech startups emerged and started providing individual financial services. These FinTech start-ups were focused on the end-customer, providing one specific product/solution; hence, they cannot be considered financial institutions. This trait makes it easier for FinTech to be more innovative and agile than the traditional bank (Weill & Woerner, 2015). Sironi (2016) sees FinTech as a global phenomenon, positioned "*at the intersection between financial firms and technology providers, attempting to leverage on digital technology and advanced analytics to unbundle financial services and harness economies of scale by targeting long-tail consumers*" (p. 22).

Table 1. FinTech timeline

FinTech Era	Era Features
FinTech 1.0 (1866-1967)	Started with laying the transatlantic telegraph cable, this was an important stem to a globalized financial system, however, banking remained analogue to a large extent
FinTech 2.0 (1967-2008)	Banking shifted completely from analogue to digital. Banks invested heavily in technology to gain competitive advantage
FinTech 3.0 (2008 – Present)	FinTech start-ups are appearing and disrupting the market

(Arner, Barberis, & Buckley, 2015)

FinTech companies provide several services including: payment services such as Apple Pay and Android Pay; peer-to-peer (P2P) lending platforms, such as Amazon Lending and Zopa; and P2P foreign exchange platforms, such as CurrencyFair and TransferWise. When comparing FinTech applications to the technologies that banks invested in throughout the years, it is evident that banks invested mostly in technologies that work in the background of their operations (back office) and less on the client-facing products (front office). This supports Philippon's (2016) argument that banks' innovations were not

enough to improve the banking system's efficiency. Post-crisis regulations were preventing technological innovations to avoid further system disruption (Krstić & Tešić, 2016). Not long after that, regulators realized the limitations of overregulating the system and softened those regulations to allow for a more flexible market (Krstić & Tešić, 2016).

The competition is of odd complexity, as FinTech start-ups seem unable to operate without banks to execute transactions in the background; FinTech does not threaten banks' existence, but it is reshaping the whole industry in a way that existing banks will play a role of enablers in executing financial transactions rather than managing banking operations throughout (Omarini, 2017). But what if banks are not satisfied with these developments? Banks have the advantage of large capital to invest in technologies and compete with these newcomers; however, for banks to compete with these FinTech companies, banks need to change their business models (Kotarba, 2016). A recent study by A.T. Kearney shows that for banks to be digitized and in turn compete with new FinTech start-ups, banks need to change many of their attributes and adopt a new set of standards and values (Jaubert, Marcu, Ullrich, Malbate, & Dela, 2014). The report suggests three values to be adopted by the institutions, as follows:

- **Client centricity** focuses mainly on overall customer experience as well as studying the role of branches. The report indicates three primary success factors in this area. Being more observant and practical to clients' needs, which urges banks to become more attentive to clients' needs instead of giving ready-made products. Banks also need to be ready to provide clients with what they need and be original in offering new solutions. And the final factor is to change the role of branches from the traditional set of services provided in the branch to a more digitized, high-value delivering branch (Jaubert, Marcu, Ullrich, Malbate, & Dela, 2014).
- **Being open to innovation** is also crucial for banks aiming to compete with these FinTech start-ups as they are continuously evolving to meet customer expectations. For a bank to be innovative, a need for internal (IT) and external (Marketing) understanding is key to integrate both aspects and provide more suitable products that reflect current market needs (Jaubert, Marcu, Ullrich, Malbate, & Dela, 2014). A pro-innovation culture that supports and provide incentives for innovation should be in place.
- **Organizational flexibility** is important as agility gives banks the ability to compete in such an environment (Tornjanski, Marinković, Šavoiu, & Čudanov, 2015). However, banks are very conservative when it comes to change, as the banking industry was quite stable for a very long time, which is reflected by the rigidity to change in the banking industry (Fasnacht, 2009). It is challenging to transform banks to be more agile due to the complexity of existing applications, constant changes in customer behavior and the increased amount of data, such as number of account holders, transactions, etc. This shows why such transformation cannot be made overnight, as banks have operated in a stable environment for a long time, which has generally resulted in a slow-paced change in the industry (Tornjanski, Marinković, Šavoiu, & Čudanov, 2015). Accenture (2018) suggest the following five characteristics of a more agile bank (Table 2).

Further to operations and regulations, digital transformation in the financial industry is likely to also affect job descriptions within banks. Jaubert, Marcu, Ullrich, Malbate, & Dela (2014) discusses job descriptions that combine both IT and marketing skills to meet market needs and promote innovation. However, there is limited evidence of studies that unpack how FinTech affects core aspects of banks, such as corporate banking, retail banking, and treasury management, among others. The extant literature

Table 2. Having an Agile Bank

Characteristic	Definition
Customer First	Offering customers “what they need,” not “what the bank has,” hyper-personalized products and services.
Test, Learn, Tweak	Replacing complex distribution processes, continually adjusting offerings as the market dictates.
Revenue Ready	Transforming fixed costs into variable costs and investing savings in revenue generation opportunities
Right Challenging	Combining digital and physical channels to grow market share without traditional branches.
Fast Twitch	Flexing distribution, making channel decisions quickly and often

(Accenture, 2018)

on the current applications of FinTech shows that FinTech is not only involved in retail clients, but also corporates with the use of P2P lending platforms (crowdlending), funding platforms (crowdfunding) and Robo-Advisors, among other applications and platforms. When looking at corporate banking, it is argued that the relationship between the relationship manager (the bank) and the CEO & CFO (the client) has a significant role to play in relation to decision making for financing, for example. This reflects the subjective part of credit relationships and lending in banks that are hard to quantify. This raises the question of whether FinTech companies / applications are able to compete with such crucial decision-making professionals in corporate banking and other vital areas in banks, and whether new technologies can be developed to quantify qualitative attributes. Ultimately, this raises the question of what would be the required skills for such competition between Fintech and other banking professions?

Having said that, it is important to prepare students to the new financial industry and explore whether professionals need to learn about new technologies and how such knowledge can be obtained by both students and professionals. Education is key for the growth of any economy (Goldin & Katz, 2009). For the financial sector in particular, it is important for practitioners to have a solid background in analytics and general business, which is mainly obtained in universities and higher education institutions (Cornuel & Thomas, 2012). However, it has been argued that use of information and communication technologies (ICTs) is taught as part of computer science or similar studies and not so much as part of business education (Picatoste, Pérez-Ortiz, & Ruesga-Benito, 2018). These authors argue that, in this current fourth industrial revolution, technology training is essential. Chuang (2017) and Hsiao, Shu, & Huang (2017) suggest that there are different ways to introduce ICTs skills to students, for instance by offering the knowledge in the form of tools rather than introducing separate curricula to students. This could be of benefit to students irrespective of field of study.

THE RESEARCH STUDY

In this section, the authors explain their research approach and the reason behind using such approach and discuss the research findings.

Methodological Approach

A case study approach was adopted whereby the banking industry in Saudi Arabia was selected in an effort to understand how FinTech is affecting the set of skills required the banking industry. Cavaye (1996) argues that case studies are appropriate when theoretical knowledge on a phenomenon is limited, as is the case of digitalization and FinTech in Saudi Arabia. The case study involved interviews with eight participants with experience in the Saudi banking sector and professionals working in FinTech companies in Saudi Arabia directly and indirectly. The interviews include bankers with more than fifteen years of experience in the financial sector in general and currently holding senior roles in corporate banking in their organizations, the reason of choosing corporate bankers is the exposure that a corporate banker gets from interacting with different clients from different industries. These bankers handle portfolios with companies from different industries that are either working on the FinTech infrastructure in Saudi or companies that are already affected by digitizing some of the roles in their operations. The interviews also included professionals who are working as consultants to FinTech companies and/or the regulators, entrepreneurs investing in FinTech companies, senior managers in FinTech companies and consultants to small and medium enterprises (SMEs) for implementing FinTech in their companies.

Table 3. Research participants' characteristics

	Pseudonym	Current Position	Expertise
Bankers	Omar	Area manager in corporate banking in one of the largest banks in Saudi.	15+ years in Investment Banking, Corporate Banking, Credit and Risk.
	Sami	Head of Corporate in one of the largest banks in Saudi	15+ years in investment Banking, Asset Management, Corporate Banking, Credit and Risk.
	Ahmed	Team Leader in corporate banking in a large bank in Saudi.	10+ years in Finance Department, Corporate Banking, Credit and Risk.
	Essam	Senior manager in finance and liquidity management in a leading Saudi bank.	10+ years in Finance and Liquidity Management, column writer specialized in Saudi economics.
FinTech Professionals	Mohammed	Head of Investment in IT solutions company.	5+ years in Investment at an Investment arm of a Technology company, Investment Banking, Investment at a Fintech company, Development of Technologies.
	Rashid	Supporting SMEs in finding suitable Fintech solutions.	5+ years in Technologies in payments services and Fintech in Saudi, Consulting Fintech start-up companies.
	Majed	Consulting Fintech start-ups and regulators.	10 + years investment Banking, Fintech Consultancy.
	Rakan	Working on a Fintech start-up.	5+ years in Corporate Banking, Consultancy, Start-ups entrepreneur.

Table 3 above presents the participants along with their demo-biographical characteristics. The diverse backgrounds give a more general view to what is currently happening in the market and utilizing such to have a feel on where the FinTech tide may be taking the market. The interviews were structured to be completed within thirty-minutes, however, some interviews were extended to reach an hour depending on the course the discussions took. The authors used NVivo 12 to transcribe, code and analyze the interviews. The data were analyzed thematically and participants' names and organizations have been anonymized.

The Research Findings

Discussed in this section are the perceptions of the different groups of participants in the study. The findings explore the current market in parallel to the set of skills that current and prospective bankers need to acquire.

The Bankers' Perspective

Participants emphasized that FinTech as a concept is not new to the market; however, the current form of it is new. As shown in the Background section, FinTech has existed since the 1860's. Nevertheless, until the first decade of this century, technology was used to give competitive advantage to existing market players, being banks, etc. (FinTech 1.0 & 2.0). However, in FinTech 3.0, IT companies entered the market as a single service provider, competing with banks and other financial service providers.

While interviewing the bankers, the authors noticed different views when it came to understanding FinTech. Some bankers viewed FinTech as a new phenomenon that may change the role of banks due to the following reasons:

- **Lower Capital Required:** FinTech companies are single service providers that depend on technology more than labor.
- **Lower Operational Costs:** FinTech companies are not banks; hence, their operational activities are much lower than banks, i.e. payment processing, Know Your Customer forms (KYCs).
- **Lower labor costs:** This is because of the single service structure and dependence on technology.
- **Less Bureaucracy:** Bureaucracy limits the agility of an entity, which is key for such companies, as it enables more innovation.

Omar also explained how banks may be more back-end oriented, giving up the front-office activities to FinTech:

Of course, if you think about FinTech, it has a lower cost, they will not be labor-intensive as banks. It will be eliminating the middle-man in some functions. It will be leaner and more efficient. There will be more regulations coming up on FinTech in the future. (Omar)

While the above quote reveals estimation that FinTech will acquire a large market share from banks' front-office activities, another view shared by some of the banking experienced participants in the study was that FinTech companies are likely to complement existing bank format by aligning their services to banks. Implying that banks may acquire or white-label these FinTech. By doing so, the competition is eliminated. In the following extract, Ahmed views FinTech as complements to banks:

No, FinTech complements the product offering of the banks. This is what we call "white labelling" using the banks at the back end but at the front FinTech is providing the platforms. There is no competition whatsoever, the banks still can make money from these products by aligning themselves to these FinTech. (Ahmed)

Nevertheless, it was agreed that FinTech will only succeed with the help and support of the regulators. Albeit the conservative approach of banking regulations in Saudi in the past, the regulators are currently proactive in the FinTech area and are pushing for more implementation and higher penetration while keeping their conservativeness by giving license to FinTech companies after studying all aspects of each specific application or service. The main force moving the regulators to be more proactive is the Vision 2030, which has the Financial Sector Development Program as one of its thirteen pillars:

The government has a driving force for development of the economy. The whole economy is depending on the government. The whole FinTech is part of Vision 2030 adopted by the crown prince. There is a dialogue between FinTech and regulators. (Omar)

In order to analyze the FinTech market, it is key to know why technology firms are entering the financial sector. Banks are large bureaucratic companies that are very rigid. Such rigidity restricted banks from upgrading their front-office products to be more customers oriented. On the other hand, FinTech companies are much agile, very small and are a single-service provider:

The financial sector lagged development on how business model is working, and services offer compared to other sectors. The banks flew large enough to make it difficult to come up with more customer oriented and service-oriented product offerings and FinTech being small companies digitally driven have been extremely successful and it's a trend that is expected to continue and it's the future. (Sami)

It was noticed that bankers believe that FinTech are not only threatening banks, but also bankers. Especially those who have been in the industry for a longer time, as the disruption to the sector requires a new set of skills that necessitates agility, which is opposite to the nature of the conventional banking system. A new form of bankers is expected to appear, they are expected to be tech-savvy:

Some of them will be dying breed. That's the norm of life. It is an inevitable change and people will have to upgrade themselves. This is a new industry that is likely to attract and create other sectors, which will have an impact on the number of people employed. But it will reduce the number of people. (Omar)

From the above, the authors noticed that FinTech is still vague for bankers. As mentioned in the previous section, for a long time, technology was used by banks to compete among each other, but was never used by non-banking companies, specifically technology companies. The change of competition nature had the banks in a shock-like stage especially that the Saudi banking industry is a conservative one. Regardless of the conservative nature, Saudi Arabia is still the largest economy in the Middle East and thus, global FinTech are keen to enter the Saudi market:

Each geography and each country have its set of characteristics and features and no one FinTech can dominate. So, the central bank being tight on Saudi keeping the system closed so FinTech that will be developed within Saudi will have an advantage but at the same time we see large FinTech wanting to localize their solutions to Saudi Arabia. (Sami)

The financial technical knowledge has always been key for bankers, however, the current market changes are technological changes. Such changes require a new set of skills to be added in the banking

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industry. New areas are expected to rise in banks to allow banks to compete with FinTech and current bankers do not have the skills that enable them to adapt to such changes:

There are certain functions within banks that will have less impact than others. Generally speaking, banks will start having more people that are scientists, data analysts, computer engineers and much more robust and stronger IT and digital team than now. (Sami)

Business schools need to focus more on technological knowledge. The way business majors are taught haven't change much throughout the years, theories in finance, accounting and economics are not changing as frequent as computer science is. FinTech companies are technology companies providing financial services and in order to have a competitive advantage in this area, one needs to have both business technical skills and technological skills. However, the areas of concentration are not clear yet. Being tech-savvy is key, but one needs not forget the business technicalities:

They will be tech-savvy, basics of liquidity management. It is hard to picture the required set of skills. (Omar)

Omar also added that there should be business technologies curriculums added to business schools to prepare students for the market in its new form:

Business school will have to provide courses covering the tech aspects. (Omar)

Bankers have different views to the competitiveness of FinTech. Some consider it as a threat to banks, others believe they will complement banks and upgrade customer experience. Yet, there is an agreement that bankers need to learn more about new technologies if they want to lead in the new banking era. There is also a consensus regarding adding supporting curriculums in business schools that would give students the knowledge needed in the new banking market. The authors notice the effect of being in such conservative market for a long time in how bankers read the future of the market. There is a vague image of where this is going in the eyes of bankers, and this view will be cleared with more knowledge in modern technologies.

The FinTech Professionals' Perspective

FinTech professionals have a clearer view about FinTech than bankers, mainly because most of them were bankers who shifted to the tech field. By looking at FinTech's target market, it is clear that FinTech seek markets where they can scale; as the services are usually extremely cheap in price (Economies of scale). The Middle East is a very promising region for startups with room to innovate and create new products. The GCC are the richest countries in the region and many opportunities are arising continuously in the GCC. Saudi Arabia is by far the largest economy among the GCC with the largest population as well. The number of SMEs is also growing in parallel to the Saudi government's support to these SMEs by establishing several agencies and programs to support the growth of these SMEs:

Fintech generally look for markets where they can scale and in GCC, Saudi is the largest market which makes sense for FinTech who is looking to work in the GCC to consider Saudi Arabia in the region. (Majed)

The competition with banks is in areas with exposure to large populations, this means individuals and SMEs. The banking service that is most used by individuals is payment. The increasing number of payment gateways that also provide other Client-to-Client (C2C) transfer services is rising in Saudi Arabia (e-wallets). STC Pay for example is an e-wallet that provides transfers to other people using the application as well as cost monitoring for family members, etc. Banks are expected to lose their market share of such activity in the beginning; however, they will regain such market share by acquiring the most successful ones:

Yes, especially for payment gateways. They will be affecting banks. We will see many startups coming to this area competing, trying to excel and eventually be acquired by banks. (Rakan)

Another scalable market is the SME sector. SMEs usually are of low income to banks, the credit facilities required are relatively low, the Non-Interest-Bearing Income (NIBs) coming from the current accounts are relatively low as well and they have high operation cost on banks. FinTech solutions can be of use for these companies. Below, Rashed gives an example of Points of Sale (POS) machines, another opportunity is P2P lending as well. SMEs are usually of higher risk to banks, meaning they are offered higher interest on their credit facilities. In this context, Rashed considered this as collaboration with banks rather than competition as many banks are not interested in dealing with such segment:

Banks are considering FinTech more of a collaboration rather than competition to take away parts of business that are high on operation and low in income such as; POS machines, etc. (Rashed)

It was established that a FinTech is a company that provides a single financial service; therefore, a FinTech cannot replace a bank. However, can multiple FinTech replace banks? Majed believes that FinTech are far from replacing banks:

There are very few FinTech which have become sort of banks, which are considered as challenge to banks in the financial industry. FinTech cannot become banks because they do not have the data base, the trust factor nor the scalability that a bank has. (Majed)

In Saudi Arabia, the central bank is driving and pushing for FinTech to enter the market and come up with several innovative services. This alone is a new approach in the market; as the Saudi central bank has been known for being a conservative one. The Saudi Arabian Monetary Agency (SAMA) and the Capital Market Authority (CMA) created a FinTech sandbox; where startups come and present their products, have it tested from several aspects before sending them to the market. An entity named FinTech Saudi was created to support the regulators and FinTech in this process:

The market is driven by the regulators. The regulators are creating a sandbox for innovators, but innovators should not step-out of the box in ways that provokes the regulators, something like creating crypto exchange. The regulator always concerns fraudulent activities and avoids anything that has a fraud risk or money laundry risk. (Mohamed)

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Even though the main regulators are pushing and driving the market, existing regulations remain challenging to the market. FinTech, similar to banks, go under several regulators, these regulators are not yet ready for such market:

Needing to approach several governmental entities to obtain licenses, each with different requirement. There are no regulations in place for areas such as P2P. (Rakan)

The above-mentioned quote takes into consideration all regulatory bodies and not only SAMA and CMA. Other related parties can be the Ministry of Commerce and Investments and the Ministry of Labor, among other parties.

The regulators are not the only conservative party in this paradigm. The market is very conservative as well. For a long time, SAMA has been pushing for a cashless society, which has not been a success so far; as the penetration on plastic cards remains low. To push the society to FinTech solutions is even more challenging than plastic cards:

Also, educating people about FinTech and to make them trust the technology, especially when it comes to money, people are hesitant, we've seen people being resistant technology was introduced to different sectors. The Saudi market is very conservative and traditional. (Rakan)

Current bankers should be educated in this area, such knowledge with existing experience can be used to create new ideas and give banks competitive advantage:

There needs to be an element of self-learning to be able to understand what's happening to the world. (Majed)

The new market does not lack financial technical skills, or technological technical skills. However, a combined set of skills is needed, someone who understands both aspects and how to utilize technologies to serve the financial industry. Such knowledge is expected to be taught in universities to have well equipped graduates:

The technical skills have been a challenge that is also being addressed with university partners. (Majed)

Universities should add new majors introduced into these universities. FinTech should be added to majors, majors such as "FinTech and Investment", etc. Mix and match new majors. (Rakan)

On the other side, another idea to equip students is by offering internships in FinTech companies and gain such knowledge hands-on:

I don't expect people to get such knowledge from Universities. Students need to go and work for FinTech companies and learn from them, do their internships there. (Mohamed)

FinTech professionals have a clearer view of the market, however, there is a push for regulators to improve the regulations, and they are. This push for more agility and innovation is new to the banking industry in the country, yet it is strong and there is support from the regulators and the government.

Scalability is key for FinTech and the market has the potential for FinTech to grow given the support that SMEs and startups are getting from the government. Having a scalable market is not the only ingredient for a successful FinTech, FinTech needs to employ more capable people and these are people with both financial and technological knowledge. There are a few ways to prepare students for such market, the first is to educate them in universities by adding some sort of a business/financial technologies courses. The other way is to send students for internships in FinTech companies to learn hands-on.

SOLUTIONS AND RECOMMENDATIONS

In this section, the authors discuss the themes that emerged from the study and provide recommendations for industry practitioners, academics, students and universities. Two main themes emerged in the analysis: (a) FinTech target market, being scalable and less focused by banks; and (b) the changing set of skills of current and future practitioners, with the second theme being a direct result of the former, requiring rethinking in terms of the skillsets required by future employees in the sector. Discussed next are the theoretical contributions of the study, followed by practical recommendations.

Theoretical Contributions

A common theme between participants from both sectors was the disruptive nature of such innovation in the financial industry, especially the banking sector, reassuring Philippon's (2016) theory that the banking industry was focused on back-office improvements rather than front-office. Another common theme was the acquisition of FinTech by banks. By doing so, banks eliminate competition while also potentially affecting their bureaucratic nature pushing for more agility. This reflects Jaubert et al.'s (2014) study mentioned in the Background section.

The study also shows the effects of having a conservative banking system, despite its traditionally positive effect on the Saudi economy by protecting it from global economic crises such as the one in 2008. The conservative nature of the regulators was reflected on banks as well; the rigidity and resistance that bankers show to such change reflects the views of Fasnacht (2009). Despite the fact that the regulators are the ones pushing for FinTech penetration, their late adoption of this program reflects the conservative approach of the ecosystem, which is being forced to change by country leaders. Hence, the FinTech sandbox is created to promote a top-bottom change on the ecosystem as a whole by supporting FinTech startups, entrepreneurs, banks and other stakeholders.

Another important outcome from the data is the lack of understanding of FinTech and its history. Many stakeholders are not familiar with the FinTech timeline suggested by Arner et al. (2015). This adds to the challenges that regulators face to increase the penetration of FinTech. Such a challenge comes from the public users of FinTech solutions. For many years, the regulator has been pushing for a cashless society and the penetration levels for plastic cards are not satisfactory to the regulators. FinTech is even more challenging.

As for banks' existence, the study shows that it is very unlikely for FinTech companies to be banks, supporting Omarini's (2017) suggestion that FinTech needs banks to operate; rather, FinTech will digitize and automate most banking operations. The study shows two main ways of gaining such knowledge in technology and information systems: (a) class-room teaching, i.e. university taught curricula for students and training sessions for practitioners; and (b) on-job training, i.e. internships for students in FinTech

companies. Both findings reinforce the suggestions made by Chuang (2017) and Hsiao et al. (2017) that ICTs should be embraced within existing education curricula.

Practical Recommendations

With the fast pace of FinTech integration in the Saudi economy, it is inevitable that practitioners will start learning the new technological trends in order to gain competitive advantage in the new market. The data showed that FinTech is still in its early stages and is targeting the market that is overlooked by banks. Nevertheless, FinTech is creating new opportunities in the industry and practitioners need to learn more about technology to be able to compete. Banks are also expected to support their staff and provide learning and development programs in the area of FinTech to explore new ideas and ways to use new technologies in their interest.

University students also need learn more about the current trends and try to link them to their studies. Many schools are focusing more on FinTech and offer FinTech-specialized programs. However, not all knowledge can be gained from school; students should also gain hands-on, practical experience, for example by doing internships in FinTech companies. Universities are also expected to develop partnerships with FinTech companies to ease the process of their students' internships, as faculty will be integrating technology in their existing curricula to maximize their students' exposure to these trends.

FUTURE RESEARCH DIRECTIONS

The study presented has limitations which give rise to direction of future researches. For instance, a small group of participants took part, which may limit the generalization of the findings. A quantitative approach is likely to enable more statistically generalizable results. Even within the Middle Eastern context, the findings of this study may not be relevant, as the region has economies that are extremely poor and others that are significantly wealthier. A multi-case study approach involving regions with diverse levels of economic development may be useful to that end. A final remark here relates to who informs the results of a research study. This study has taken the case of bankers and FinTech professionals; it would therefore be useful if future researchers adopted a multi-perspective approach by considering other stakeholders in the industry—such as end-users and regulators—which would help to paint a richer picture of how digitalization and FinTech play out in the wider financial ecosystem.

CONCLUSION

The study was initiated to explore how FinTech is affecting the set of skills sought in bankers in the Saudi financial context in particular; an under-explored research context. The study offered a better understanding in the idiosyncrasies of FinTech in the selected context and identified implications for practitioners, educators and students, which were discussed in the previous sections alongside directions for future research.

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KEY TERMS AND DEFINITIONS

CMA: Capital Market Authority (in Saudi Arabia).

Digital Disruption: The change of the nature of an industry that is caused by digital technologies.

Digitalization: The use of digital technologies to upgrade processes.

FinTech: The use of technology in the financial industry.

Payment Gateway: An app that enables the user to pay through the mobile without the need for physical cash/card.

Peer-to-Peer Foreign Exchange Platforms: A platform connects two similar clients to exchange currencies, i.e. individuals to individuals, small companies to small companies.

Peer-to-Peer Lending: A platform that connects two similar clients to lend and borrow, i.e. individuals to individuals, small companies to small companies.

SAMA: Saudi Arabian Monetary Agency.

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Chapter 8

Paving the Way for the Development of FinTech Initiatives in ASEAN

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ABSTRACT

Financial technology (FinTech) is not one to be ignored under any circumstances. It is not only growing as a concept but a phenomenon that has been manifested in non-financial sectors using innovative technology to bring financial services straight to the customers. The creation and practical applications of FinTech supported by government regulations and financial policies, high mobile adoption, rising rates of internet penetration, and increasingly literate and millennial generation, strongly indicates that the various scopes of FinTech in ASEAN are very promising in supporting economic growth and financial inclusion. This chapter will provide an overview of FinTech and examine the development of FinTech initiatives to shed light on some challenges and solutions facing the ASEAN's financial landscape today and in the future.

INTRODUCTION

The use of Information and Communication Technology (ICT) has a long history in the financial services and business industries. Financial services industry, being regarded as the early adaptors of ICT (Puschmann, 2017), has brought about the fastest digital revolution of Financial Technology (FinTech). From simply providing and supporting back end technological support for financial service providers to a more user centric services and automation of decision-making (Dorfleitner et.al, 2017). The significance of FinTech is very much relevant today because it offers simplified and cost-effective services to

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customers, gives them access to a variety of value-added services, and enables organisations to meet their needs and preferences. More importantly, FinTech has brought the need to communicate everywhere and at all times without being confined to one space or location. Internet and mobile banking has gradually reduced the physical interaction between customers and financial institutions and replacing money with digital currency. This has considerably reduced customers’ need to visit bank branches, which is however viewed as ‘disruption’ in the financial services ecosystems by the financial service providers.

The issue with FinTech Innovation and its applications are growing too fast that even regulators are struggling to keep up with it, and the financial industry is a high profile industry that demands the paramount security. Although FinTech can be seen as disruptive innovations to traditional banking transactions or conventional services, the growth of FinTech companies has increased rapidly over the years and the new trends in the services industry will also likely continue to expand globally. Figure 1 shows that North America received the largest amount of funding in general, increasing from US\$2,583M (in 2013) to US\$8,281M (2015). The amount decreased by US\$2,390 in 2016, but later increased by US\$1,946M in 2017. Asia is the next largest FinTech funded continent – increasing dramatically from 2013 to 2016 by more than 1600%, and decreased for the first time in 2017 by only 10%. Europe FinTech funding grew over 120% in 2017 from US\$1,210M to US\$2,676M (Gromex, 2018).

Figure 1. Trend of Fintech funding
 Source: *FinTech trends to watch in 2018*



After the global financial crisis in 2008, not only the financial services industry in the ASEAN region has begun to evolve at a rapid pace, the popularity of FinTech is also on the rise in Southeast Asia. ASEAN comprised of ten Southeast Asian countries, already showed their intentions to accommodate FinTech and its investment has surged, jumping 45 percent year-over-year to US\$366 million in 2017 (EY, 2018). Iwasaki (2018) indicated the development of FinTech in ASEAN has huge potential to fundamentally change the way countries solve many issues affecting the financial environments such as low bank account holdings and limited access to bank loans and credit cards (Iwasaki, 2018). Given that there have not been many studies on FinTech in ASEAN setting, this chapter aims to provide an overview of ASEAN’s FinTech landscape, focusing on the dynamic growth and advancement in FinTech product and application.

AN OVERVIEW OF FINTECH

FinTech can be described as any technological innovation used to deliver financial services such as investment, payment and cryptocurrencies (Wigglesworth, 2016), to customers not confining to any specific sectors or business models (example, peer-to-peer lending). In particular, FinTech has changed the financial services industry, affecting the entire scope of services and products that are traditionally provided by the industry (Arner et al., 2015). In the past, FinTech was used to support back end processing technologies in banking and financial institutions. However today, FinTech has expanded in scope, offering services for the betterment of end customers or users. It started with Automatic Teller Machine (ATM) in 1967 by Barclays Bank to cater for end users (Arner et al., 2015). Table 1 presents the evolution of FinTech, starting from 1993 when the term ‘FinTech’ was first coined until 2014. FinTech enables the delivery of financial innovation that resulted to new business models, applications, processes, products, or services with an associated material effect on financial markets and institutions, and the provision of financial services (Schindler, 2017). FinTech products include cryptocurrencies such as Bitcoin and Ripple, and mobile-based payment and online payment solutions like Apple Pay, AliPay and many more (Milne, 2015).

Table 1. Evolution of FinTech

1993	FinTech was the original name of the Financial Services Technology Consortium, a project initiated by Citicorp, an effort to overcome a reputation for resisting technological collaboration with outsiders.
1995	Wells Fargo became the first bank to offer an online checking account.
1997	The first virtual banks, without physical branches emerged.
2008	ING Direct launched in Canada, as a subsidiary of the ING group. The financial crisis of 2008, which left the global financial system on the brink of systemic collapse, can be viewed as the turning point for FinTech.
2009	Version 0.1 of Bitcoin SW is released. It includes a Bitcoin generation system that would create a total of 21 million Bitcoins through the year 2040.
2013	Google introduced Google Wallet, which allowed users to make purchases from their mobile phones using NFC technology.
2014	Apple similarly launched Apple Pay in 2014.

Source: Arner, Barberis and Buckley, 2017

The advent of FinTech utilizes ICT to provide financial services to people; develop solutions to payment problems, issue digital currencies and process data analytics; and to make financial operations more efficient (Micu & Micu, 2016). But the paradigm has gradually shifted. FinTech brings with it huge benefits on one hand, and various risks on the other. FinTech has been viewed as a disruptive new market force – a financial technology solution that disrupts the current practices of banking, finance and insurance sectors in doing business (Kursh & Gold, 2016). Generally, FinTech has eased the burden of carrying cash as well as lowering transaction costs for businesses. In 1990s, FinTech introduced an online banking system in order to reduce reliance on service staff and traditional teller line, the ATM usage and services. Bank branches have also shrunk in size as more customers are pushed onto digital products. The rise of electronic payment (e-payment) has decreased cash transactions, and payment processing devices such as mobile wallet and payment apps can provide ever more secure online payment

transactions. For example, Amazon used one click payment system and created “Login and Pay with Amazon” service in 2013 for making payments. Remittance between individuals using email address was also supported (Arner, et.al, 2015).

ApplePay, Google Wallet and AliPay are among the global FinTech players that have a big part in enabling e-payment (Schindler, 2017). ApplePay, an e-wallet that provides customers an alternative of making payments digitally, has been practically used in America since October 2014 (Lee & Lee, 2016). Alibaba and Tencent are two largest internet companies that provide branchless banking services such as Ant Financial and WeBank. Not only they had upgraded their FinTech to keep up, both companies also offer a wider choice of services and better access to banking and financial services (Lee & Teo, 2015). Blockchain is a type of FinTech, aimed at creating a decentralised digital public record of transactions that is secure, anonymous, tamper-proof and unchangeable. Instead of maintaining a private database of records, blockchain technology makes all records public (Gavril, 2017). This implies that people may no longer need a bank to transfer money or keep their account records. Specifically through blockchain technology, crypto-currencies such as Bitcoin and Ripple have become the most widely adopted FinTech product in the world (Milne, 2015). Bitcoin that was developed by Nakamoto, is today’s leading crypto-currency that has not only changed the currency markets (Broby & Karkkainen, 2016), but enabled the digital currency transfers to be priced at a wholesale rate that would not be available to most customers and offered full disclosure of how much they are paying (Laven & Bruggink, 2016).

STATE OF FINTECH IN ASEAN

The rapid digitalisation of our economy and financial sectors, gave rise to FinTech in ASEAN as an important part of cooperation to seek out new and innovate solutions to solve problems of financial inclusion. Much of the attention on financial inclusion has been on lifting people out of poverty by introducing them to financial services. The rise of FinTech also provides a great alternative for Small and Medium-Sized Enterprises (SMEs) financing and filled the gaps in ASEAN’s sustainable financial system. Digital finance in Southeast Asia brings the benefits of financial services to those who have no access, and allows them to take steps toward a better financial life. FinTech has significantly lowered transaction costs, in which the mass adoption of smart mobile devices with affordable internet access undoubtedly influenced the customers’ behaviours on how they want to get access toward financial or banking services. Moreover, there is a shift in the balance of power between financial services regulators and FinTech companies that disrupts the traditional distribution of services to financial institutions and customers in multiple jurisdictions. Some of these FinTech developments in ASEAN member countries which may have been driven generally by the difficult post-crisis environment for banks are presented in the next section.

Brunei Darussalam

The development of FinTech in Brunei Darussalam (Brunei) has been slow and generally insufficient to address financial inclusion in a sustainable manner. FinTech Unit at the Authority Monetary Brunei Darussalam (AMBD) was only established in Brunei in 2017. Although FinTech adoption remains early stage technology development in boosting customer experience, for the most part there has been some progress (ASEAN Today, 2018). To encourage a thriving financial environment for innovative ideas,

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AMBD launched a regulatory sandbox to facilitate the development of FinTech and developed regulatory guidelines for the sandbox. The regulatory sandbox in Brunei's context is to enable local start-ups to develop and test their FinTech services and applications, and execute programmes for monitoring and evaluation (Biz Brunei, 2017). As AMBD has been actively directing most of its efforts to further facilitate the development of Islamic Banking and Finance, there is a growing market potential of Islamic FinTech in Brunei by promoting mutual consent, timeliness, honesty and goodwill – *Syariah* principles governing Islamic finance products and transactions.

Bank Islam Brunei Darussalam (BIBD), the largest Islamic Bank in the country, currently provides digital banking system called BIBD NEXTGEN to respond to the increasing use of online and mobile banking platforms such as BIBD Mobile, to manage their day-to-day banking requirements. BIBD Mobile is an App that can be downloaded in smartphones and tablets which allows customers to transfer money or pay bills, and BIBD QuickPay, a feature in BIBD Mobile, is a quick cashless payment option whereby customers simply scan QR codes to pay for goods or services (BIBD, 2018). BruPay, a Brunei based FinTech Company that specializes in providing e-payment solutions approved by the AMBD, provides a platform for e-Wallet application that allows customers to make cashless payments as easy as taking pictures, such as for purchasing prepaid top-ups, bills and even transfer money to anyone instantly using a QR Code or a smartphone (Biz Brunei, 2018). While other card-based digital transactions charge 3 percent per transaction, BruPay does not charge commission (transaction) fee and offers the merchants to post their item list to the public (Wong, 2018). One important observation that perhaps explains Brunei's weak level of competitiveness in FinTech sector within the region is that the market is small and the country is also not strong when it comes to innovation. Hence, the alternative way is to replicate models that have proved successful in other countries.

Cambodia

Financial inclusion through FinTech application plays a critical role in Cambodia. Retka (2018) reported that financial inclusion in Cambodia has resulted in an increase in Gross Domestic Product per capita from \$1024.9 in 2015 to \$1135.2 in 2017. In 2016, the National Bank of Cambodia (NBC) estimated that 71 percent of the country's population had access to financial services, while 59 percent still use formal banking services. Investment of money into FinTech has certainly grown, and is becoming an urgent necessity for helping the unbanked and under-banked population to access financial services, as well as to enable Microfinance Institutions to deliver the services to customers in remote areas at low cost and of a high level of security. The NBC felt there is an obvious need to build supportive environment through the licensing of payment services providers (Serey, 2017), which had just been given such strong political support. Improving financial outcomes with FinTech has been a game changer for promoting development and regional partnership for financial inclusion between China and Cambodia (Ng, 2017).

As FinTech gains more traction and attention in Cambodia, one of the biggest challenges remains educating people to embolden them to switch from cash payments to cashless wallets. They fail to see the need to move beyond operating in cash because traditional cash-based services are common and still highly prevalent in the country. Due to lack of education and awareness, they have also failed to take advantage of all the benefits of online services. Many do not adopt new technologies due to the unavailability of information and instructions in Khmer language in smartphones. English as a language barrier is an issue that needs to be addressed in adopting FinTech (Phong et al., 2016). AlienDev, an IT Company, offers a powerful solution to support learners' needs in Cambodia. The Company developed Khmer Smart

Keyboard so locals can understand as they embark on using FinTech app for their everyday financial needs. Wing Company, a successful FinTech startup which performs like mobile money agent network, is targeting the unbanked population to provide them with financial services such remittances, top-ups and mobile payment. Banhji, Cambodia's first FinTech company, has also interestingly used free online accounting software to reach out to thousands of SMEs across the country and help them with inventory management, improved cash flow, accounting and tax compliances and invoice payments (Pesin, 2017).

Indonesia

The World Bank recognizes Indonesian FinTech as the fastest growing industry across Southeast Asia. The industry has brought together citizens into the formal financial system with interventions by the regulators and increased number of FinTech startups, (Hoesin, 2018). The emergence of FinTech has become the best alternative to working for unbanked population, startup companies, and SMEs to grow their businesses. According to *Otoritas Jasa Keuangan* (OJK) – the Financial Services Authority of Indonesia, payment of credit through FinTech in Indonesia has reached IDR 7.8 trillion (approx. USD \$534 million) as of July 2018. This revenue comes from 66 local peer-to-peer lending sectors alone (Indonesia Investment, 2018). The estimated US\$22.338 billion worth of transactions in the FinTech market for 2018 could experience even greater growth moving into the coming year (FinTech News Indonesia, 2018). The government's support towards the development of FinTech and low transaction fees are vital for effective collaborations with FinTech companies to create synergies and encourage innovation without hampering evolution. In essence, supporting FinTech is a means toward increasing financial inclusion and access for the people of Indonesia while backing positive social and economic outcomes, as well as ensuring stability of the financial services systems.

Nonetheless, there are some real issues in many parts of the Indonesian communities where the issue is much more than just unbanked and underbanked population. The vast majority of the population remains atomised and unorganised, and have not been able to afford good smartphones or access financial services due to lack of sustainable financing and banks' lengthy procedures and administrative barriers. Cheaper smartphones and internet connection will pave a way for financial inclusion and accelerating FinTech innovation, leading to substantial cost savings as well as increasing competitiveness of e-commerce activities in Indonesia. The extent FinTech may pose systemic risks to financial systems is still a matter of concern, despite the government's ambition to make Indonesia the largest digital economy in Southeast Asia by 2020 and major banks' investment in local startups. The recent ban for using cryptocurrencies to make payments among unbanked population has a major impact on businesses, affecting the way they transact with constituents (Maulia, 2018). This situation has forced the government to restrict market access by capping foreign ownership in e-money providers at 49%, continue doing research on the impacts of FinTech and enact effective policies. These actions are very much needed for risk mitigation to shape the future of financial services that benefits all stakeholders.

Laos

FinTech in Laos is in the very early stages of development, and the government is continuously working on numerous initiatives with industry participants and FinTech companies to allow experimentation while maintaining sector stability. Yet, the underlying issue of many problems faced by the government is the lack of resources and capabilities to build FinTech ecosystems for the startups. This is critical to

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nurturing the kind of technological innovation necessary to make financial markets and systems more efficient. The Laos government recognizes the potential benefits of FinTech in helping their millennials with finance and how FinTech ecosystem can stimulate the broader local economy and enable growth opportunities for many sectors. But there are also some challenges associated with it. While corporate interest is growing, Laos's FinTech startup sector is still lack of infrastructure it requires for future growth. The lack of dedicated incubators and accelerators, angel investors and venture capitalists also holds back booming of FinTech startup sector (Kong, 2016), because funding remains a major issue for startups. Funding is an existential part of running a startup, and unfortunately not many startups in Laos are investment ready which suggests it is not only money but the startups are also looking for strategic help and advice from their investors.

The millennials in Laos may have grown up with a new respect for FinTech entrepreneurship and their enthusiasm for starting their own business or going out on their own should be nourished to embrace the FinTech economy. Although startups' lack of experience is rarely brought up as an issue, this is a sticking point in FinTech industry and has certainly been a point of discussion. Laos faces challenges in developing FinTech startups because the market is small and at its infancy with consumerism being very new to Laos's citizens. Tung (2015) shared that only less than 10 percent of its seven million populations expressed their confidence and willingness to purchase products and services from local startups, and majority of the population still do not have access to either smartphone or Internet service. Although only 20 percent of the population have access to Internet services, the focus of Laos government is to encourage growth across all industry sectors including low, medium and high-tech firms, not simply fostering more startups. Similar to Indonesia, cheaper and faster Internet will help the FinTech startup ecosystem to thrive in Laos (Kong, 2016). To work towards developing digital solutions that can reach the broadest portion of the population, local startups have been required to refine their business models (Kong, 2016), have a dialogue and build sturdy and beneficial partnerships with multinational organisations, banks and third-party partners or providers (Danchainam, 2018).

Malaysia

FinTech is a fast-moving industry, and its benefits are widely visible and accepted in Malaysia. The proliferation of FinTech apps has been shown to affect the society, and the government policies 'fit for purpose', plays an important role in creating conditions in which businesses flourish. In 2016, the Central Bank of Malaysia launched the Financial Technology Regulatory Sandbox Framework (FTSF), which sets out the criteria for participating in the regulatory sandbox. All the digital products and financial services offered in the country must comply with applicable laws and regulations, and the FinTech companies and financial institutions are given the flexibility to experiment their innovative FinTech solutions in a live controlled environment with the appropriate safeguards. FinTech in Malaysia is seen as an opportunity, rather than a threat or 'disruptive force' to banking industry. FinTech complements banking institutions, and supplements or diversifies the existing financial system. Maybank, one of the most used banks in Malaysia, is among the first few banks to embrace FinTech adoption (Fong, 2016). In 2004, Maybank introduced an online banking for specific transactions to minimise the risk associated with such transactions and safeguard all parties concerned.

The rapid pace of FinTech businesses like MyCash Online, Neuroware and Touch 'N Go is very much dictated by people, and fuelled by global market demands for digital products and services, the constant use of the internet and the intensifying use in mobile applications, which are now part of the

everyday routine for many people. With strong community and government support for startup businesses, top 5 of listed tech companies in Southeast Asia are based in Malaysia. In 2015, Malaysia was the first country in Asia Pacific to manage fair treatment in crowdfunding in developing FinTech agenda (Cham et al. 2018). The country has an advantage to get talent and mobility of resources and adequate funding from Singapore's networks to leverage on foreign funds they might bring, as well as its information technology market is expected to continue on its strong growth trajectory. Bernama (2017) further highlighted that Malaysia's conducive infrastructure with strong internet connectivity combined with the government policies serves as a sound foundation for the further strengthening of FinTech startup ecosystem in the region.

Myanmar

Myanmar's financial system is largely controlled by banks, and about 90 percent of the population still lack easy access to formal financial services. This signifies that the country must continue to build sustainable financial services as well as create an ecosystem for financial inclusion. The arrival of mobile financial services and FinTech in the remote Southeast Asian market like Myanmar has not only called out the problems, but offered solutions to address financial inclusion. It opens new opportunities for Myanmar's government to encourage FinTech growth through FinTech ventures' increased capital investment in smartphones and internet penetration to offer a user-friendly digital interface, faster and better service to the unbanked, and a low-cost platform for financial service providers. Wave Money, the first company to receive a license under the new regulation released by the Central Bank of Myanmar, is a joint venture between Telenor, First Myanmar Investments (FMI) and Yoma Bank that offers mobile financial services. Such services provide a safe, convenient and flexible way of receiving, sending and spending money worldwide all on one online account via mobile phones or in person at any of the 4,000 Wave Shop agents.

Myanmar has been late in appreciating the sheer demand for digital information, but today FinTech innovative solutions have begun to reshape the country's business models in response to offering simplified banking services at lower costs or with less hassle or paperwork (FinTechNews, 2017). The government has also taken steps towards achieving its goal to reaching out to 40 percent of the population to have access to financial services by 2020, while encouraging 15 percent of the population to use more than one digital financial product within the same timeframe (Jones, 2016). Mywallet Plus, a FinTech company specialising in online payment and is also a joint venture between LEO TECH Services Pte Ltd in Singapore and MCC Group in Myanmar, has provided consumers and businesses in Myanmar with an online payment platform for utility bill payments, e-commerce processing and consumer bill payments. Although the mobile phone penetration rate in the country barely touched double digits in 2013, and reached only around 50 percent of the population in 2015 (FinTechnews, 2017), with so many people are now increasingly using smartphones, tablets and laptops to conduct their business, mobile virtualisation has become a legitimate and necessary option in Myanmar.

Philippines

With FinTech adoption on the rise, 86 percent of the households in the Philippines are seeking ways to benefit from deploying FinTech and access to services that were previously preserved for the wealthy. Based on the recent data collected by the Bangko Sentral Pilipinas (BSP) in 2015, these households

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had no savings account because they did not have sufficient money to open an account. They also failed to see the importance to manage one and the need to deposit money in a bank when the service charge alongside the minimum balance was set too high. It was also inconvenient for them to travel long distance when they can even run their business and banking transactions from their home based computer and smartphones supported by internet network speed. The Unisys APAC Banking Insights Survey indicated that majority of the citizens prefer paying their bills over counters. According to Akamai's State of The Internet Connectivity Report in the first quarter of 2017, Philippines was ranked the lowest among Asia-Pacific countries with an average of 5.5 Mbps and placing at 100th in the Global Ranking (Barreiro, 2017). In an effort to improve internet connectivity, an estimated \$1.5 - \$4 billion worth of investment was approved to deploy national broadband network as well as accelerating the use of wireless fiber optic technology and cables (Philstar, 2017).

A recent study conducted by Voyager Innovations and FINTQnologies Corporation (2017) showed that access to financial services for most provinces in the Philippines have been stagnant for three years (2015-2017), leading to 40 percent remain at the bottom of the country's access to financial and banking services. Low-income provinces only received 0.9 percent of total loan transactions and 2.5 percent of total domestic deposits, in comparison to the high-income provinces where the percentages ranged above 90 percent. Banks and ATMs were also generally located in the high-income provinces, leaving people who live in low-income provinces with no or limited access to financial services. The rising number of local FinTech startups to empower consumers and businesses, and give them direct access to world class financial services (FinTechnews, 2018), has made the country the fastest growing smartphone market in ASEAN. Tagcash is a digital wallet that allows consumers to top up their money through local 7-Eleven convenience stores in the Philippines, bank transfers, local agent networks and the use of bitcoins. Coins.ph is a mobile money transfer platform that is powered by blockchain technology. E-Peso, a product of Genuisys International Systems Corp (GISC), is a virtual Peso currency to support cashless products, high security, AMLA compliance, mobile money and E-Payment. PesoPay, a product of AsiaPay, is an online payment gateway system that aims to provide secure and seamless electronic payment solutions for enterprises. Overall, the FinTech ecosystem in the Philippines is fueled by the startups' commitment to build a cashless economy which will integrate financial inclusion and increase the adoption rate for FinTech solutions (Chin & Collao 2018).

Singapore

Singapore can be considered as one of the most wired countries in ASEAN. With a total population of 5.7 million, the impact of FinTech advancement can be felt from the mobile phone penetration rate which stood at 148 percent and household broadband subscription rate at 104 percent (Tan, Cheah, Chen & Choy, 2017). Singapore as the top leading financial center with 117 foreign banks and five global banks, holds the largest share and distribution of FinTech in the region (Trade, 2016). Currently, there are more than 400 FinTech companies and 30 FinTech innovation lab research centers established in the country (Straits Times, 2016), and this growth has reaped massive economic rewards. In 2017, Singapore achieved the highest record of FinTech funding in ASEAN at US\$229.1 million (S\$312 million) (KPMG's Pulse of FinTech Report, 2017). The government through its Monetary Authority of Singapore (MAS) has made great strides in FinTech and financial inclusion, and more importantly, user trust gaps have been traversed to get FinTech to where it is today (Fintechnews, 2017). With 76 percent

of consumers using card than cash and 69 percent using electronic modes when purchasing, Singapore has been ranked among the top cashless countries globally.

Singapore is also far ahead of other ASEAN cities, and scored consistently high across all sectors including insurance (3rd), banking (5th), investment management (5th), professional services (4th), and government & regulatory (4th) on the Global Financial Centres Index in 2018 (Singapore Business Review, 2018). The country was ranked fourth on GFCI, which gives rise to a prime opportunity for digital wallets to thrive. The rapid growth of smartphones and a strong push for digital wallet or e-wallet has resulted in Singapore having the highest digital wallet penetration rate. Technological change alone does not lead to more demands for digital demand, but factors such as price pressures, income growth and environmental changes all have a part to play. Yu (2017) reported that 87 percent of the country's population have shown a widespread demand for digital wallet, and 80 percent have already adopted smartphones for making e- payments (Google Asia Pacific, n.d.). This achievement is attributable to Singapore's best and strongest payment ecosystem that has significantly enhanced FinTech adoption, and increased MAS's collaborative efforts and partnerships with private players and telecommunications companies.

Thailand

Thailand's economy is expected to grow between 3.8 and 4.0 percent (Bangkok Post, 2018), and a part of the boost may have been from the emergence of FinTech. The country has gradually shifted its focus from increasing labour intensive industries to expanding their human capital for the rising skills demand for technology. Thailand faces challenges in several areas, but there are four that stands out including skilled labour shortage; not making enough return on investment, changes in consumer expectations and the increasing competition from financial technology companies. The World Bank Survey showed 83.5 percent of the workforce in Thailand is unskilled (The Nation, 2016), and such result suggested investment in building well-trained fields' expertise in science, technology, engineering and mathematics will be crucial to fulfilling the country's digital economy vision. To keep pace with the digitisation of the economy, the government regulated a law to accommodate an inflow of foreign workers to work in sectors suffering labour shortages and develop local talent through skills transfer (Jomo, 1997, p. 82).

Thailand has the potential of being one of Southeast Asia's FinTech Hubs due to its distribution of digital convergence across the country. The country shows remarkable progress on access to finance for the poor where 97 percent of the population was already either banked or given access to formal financial services which has been offered by financial providers (Christopher, 2018). The growth of mobile and internet penetration has also rapidly risen whereby its internet access has increased from 67 percent in 2017 to 84 percent of the population in 2018, and total funds raised by Thailand Tech startups increased from \$88m to \$271m (Thailand Tech Startup Ecosystem Report, 2018). In 2017, Thailand contributed about 10 percent of FinTech distribution, ranking the country as the fourth rising country in ASEAN (UOB Group, 2017). The country's startup ecosystem continues to flourish with the increasing number of investments and investors, making it more attractive to be a part of FinTech landscape. The number rose significantly, from one venture capitalist, one accelerator and three funded Tech startups in 2012 to more than 96 venture capitalists, eight accelerators and more than 90 funded Tech startups in 2017.

While digital payment is the largest market segment in the country, contributing a total transaction value of USD 6,440.9m in 2016, the country has yet to offer substantial startups in other segmentation of FinTech services other than digital financial services such as crowd funding, peer-to-peer lending

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and insurance (Kong, 2016). The National Innovation System which is key to Thailand 4.0's innovative process at the national level, plays a crucial role in building a crowd funding platform that provides financing for entrepreneurial start-ups (Wonglimpiyarat, 2017). Thailand 4.0 places greater emphasis on a value-based, innovation-driven capabilities, with human intellectual capacity replacing physical capital. Despite a stagnant market, FinTech development in Thailand has been ranked seventh among ASEAN countries in FinTech Competitiveness Index, and recognised as the country with stable political environment, secure funding opportunities, strong financial attractiveness and talent, supportive business regulatory advancement, better customer and market constructs like smartphone penetration, innovation ecosystem and business environment (Suchit 2017).

Vietnam

Although FinTech is quite new in Vietnam, the transaction volumes are extremely high with many potential service providers to come. FinTech transaction amount is estimated to reach US\$ 7,259m with an annual growth rate of 17.5 percent in period 2017 to 2021. While FinTech is one of the fastest growing sectors and the newest investment trends for startups, the country's domestic economy which heavily dependent on manufacturing industry remains positive. The manufacturing industry continues to drive robust revenue growth due to higher foreign direct investment (FDI) inflows and stronger foreign demand for Vietnamese goods. Digital payment contributed a total transaction value of USD7, 252m, representing the largest market segment in FinTech sector (about 99.9 percent). It is also one that has the largest number of FinTech startups (Tam & Hanh, 2018), in which 58 percent of the startups operate in mobile payment services (about 58 percent). The beginning of digital financial services in Vietnam including savings, credits and insurance and payment facilities through electronic devices, is still at a very nascent stage and proved to be challenging. At present, mobile 'top ups' and utility bill payments conducted through formal bank accounts, internet or cell phones are the most prevalent digital financial activities in Vietnam (Kong, 2016).

In 2017, the Governor of the State Bank of Vietnam established a Steering Committee on Financial Technology with the purpose of advising the Governor on solutions to improve the FinTech ecosystem, including legal framework to facilitate the development of FinTech businesses in Vietnam and aligns them with the government's guidelines and legislations (Sy.ngo, 2018). Smartphones and services boost internet use in Vietnam, and thereby penetrating the FinTech market even further. E-commerce and M-commerce that have expanded their reach to assist people who were previously underserved by financial services, are growing faster than the capacity of the economy to support them. For example, offering opportunities for private sector companies to partner with Vietnamese government to support infrastructure, meeting the rising demand for digital solutions and softwares, and enhanced use of space technology-based tools and payment for end-users and merchants. The current FinTech industry in Vietnam is dominated by payment solutions. Its remittance solutions, mainly the remittances sent worldwide from United States, accounted for almost USD 14 billion will create the biggest opportunity for businesses and banks to stay relevant in Vietnam.

DISCUSSION

The ASEAN Economic Community's Vision for 2025 is focusing on closing the digital gap, increasing financial access and literacy, expanding the scope of intermediary facilities (such as digital payments) and developing financial services for smaller firms and lower income groups (BusinessTimes, 2018). Population growth, invention of the new high-speed technology which increases investment demand for FinTech, development of urbanisation, and widespread of smartphone adoption are seen as part of the economic growth indicators in ASEAN as these supports digital information and communication innovation as well as technological advancements such as big data, data analytics, Industry 4.0 and Internet of Things.

Globally, FinTech has been seen as a disruptive innovation to banking & financial institutions. However FinTech in ASEAN has a rather bigger role to play. History proves that ASEAN has always been the centre of economic integration. Be it social or economic, the innovation and the technological developments taking place in ASEAN's 10 member countries have found its reverberations reaching those of other regions. The geographical expansion of international trade allows for the discovery of new and innovative ways to solve problems of financial inclusion. FinTech offers a sufficiently low cost alternative to persuade people to adopt FinTech solutions and invest in FinTech companies. While non-financial businesses and professions use FinTech to offer products or services without (or less) transacting through banking and financial institutions (Anshari et al., 2019), FinTech has succeeded as both standalone businesses and vital links in the financial services value chain (examples e-commerce and m-commerce). Market demand for innovative products and services has been pushing FinTech innovation in ASEAN.

In response to the rapid development of FinTech, convenience and security are the main reasons why consumers are adopting FinTech solutions. Singapore-based FinTech companies continue to dominate the ASEAN FinTech market, followed by Thailand and Indonesia (BBVA, 2017). Data from Tracxn showed that Singapore contributes the largest share about with 39 percent of FinTech market in ASEAN. Its strong internet and well-developed infrastructure supported by relevant and timely policies and regulatory practice framework have better positioned Singapore's FinTech companies than most Asian companies in Hong Kong and London, to succeed in global markets. The profitability and scalability of FinTech has caught the attention of investors and FinTech incubators ("State of FinTech"). Thus, countries like Indonesia, Malaysia and Thailand need to catch up with FinTech hubs and FinTech in terms of technology because investment in new technology and in adapting to the changing financial landscape are not deemed a priority before. Conventional banks have so far been unable to engage customers online whereas FinTech has, as their strength lies in online interaction.

The Rise and Development of FinTech

The rapid growth of FinTech development steers ASEAN member countries towards a cashless society. Although e-payment and e-wallet are the preferred cashless payment methods that have been effected in ASEAN member countries, followed by P2P lending, crowdfunding, and retail investments, there are still practical problems to address including internet connectivity, mobile and banking penetration. Singapore has been regarded as the most mature cashless society because it has the highest digital wallet penetration followed by Philippines, Vietnam, Indonesia, Malaysia and Thailand (Tech Collective, 2018). FinTech is easily accepted in ASEAN for the following reasons. Firstly, ASEAN's growth has been powered by its people. The combined ASEAN nation has a huge population of about 630 million

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across 10 countries, and about half of them are under the age of 30. The number is expected to expand by 373 million by 2030 (Funding Societies, 2018). Considering the growth of emerging ASEAN is largely underpinned by demographic structure and rapid urbanisation, with a young, digitally adept population and rising personal incomes driving demand in the mobile voice and data segments, this makes ASEAN as an attractive zone for FinTech industry to advance and embrace the fourth industrial revolution.

Secondly, the rapid growth of smartphone adoption and cheaper internet connectivity are the other drivers behind the emergence of FinTech, with Cambodia (173 percent), Thailand (133 percent), Vietnam (131 percent) and Myanmar (93 percent) (Viray, 2018). Today, about 3.8 million people in Southeast Asia have been connected to internet, and on average, a person spends 4.4 hours per day on social media in Thailand (Thaivisa, 2018). The high smartphone adoption, cheaper Internet access and many options of digital platform attract the attention of digital-savvy resulting in the increase of the consumption rate. The increase in smartphone penetration has made strong push to adopt e-wallet in ASEAN countries. This massive innovation created for mobile base transfer, e-wallet, and other alternative financing and App-based finance tools with a lot of options, has made things easier to access domestic and international financial services and today, people prefer easier alternatives to compare prices or find online stores for shopping. Mobile services, logistics and infrastructure improvements have made all this possible. By 2025, it is predicted that the middle class of Southeast Asia will increase to over 440 million people (Funding Societies, 2018).

Thirdly, while setting up national FinTech regulatory sandbox in an attempt to stay competitive and keep innovation, it limits ASEAN FinTech companies to scale up and expand their businesses outside their home countries. Regulators monitor and foster the development of FinTech industry in their respective countries, and are mandated to work within national jurisdictions. In response to this, ASEAN FinTech Network (AFN) brings together the FinTech ecosystems of Singapore, Malaysia, Indonesia, the Philippines, Thailand and Vietnam (BBVA, 2017), to create an open platform for collaboration, commitment to build engagement, cooperation and knowledge sharing across the fragmented ASEAN region, all with a focus on driving performance in the industry. It centres its success on training the potential FinTech workforce, improving accessibility of investment capital, global market access and deepening the availability of cutting edge (or core) technology. FinTechs like Blockchain, Artificial Intelligence and Biometric, which have the potential to create the highest impact on return on investment, have increasingly attracted many investors to invest in FinTech startups in the ASEAN region.

CHALLENGES AND FUTURE DIRECTION

The sustainability of some business models has yet to be tested. FinTech startups in particular, require business models that not only fit and relevant but also sustainable to address financial exclusion (Jones, 2016). The acceptance and adoption of FinTech in ASEAN has affected the entire global financial system by continuously engaging in financial innovations and inclusive finance for inclusive growth and development (Chen, 2016). FinTech businesses are relatively viable when they are small but will struggle to maintain their viability when the activity scale expands. It is also difficult to predict whether potential users of new financial services will become active users. Despite the significant benefits FinTech could offer to consumers, the environment remains challenging to move away from traditional banking systems and practices. Some people remain sceptical about FinTech's fulfilment and customer service

support to customers across countries, because there is a deep-rooted anxiety about security of online payments (Iwasaki, 2018).

Since FinTech in some ASEAN countries is still underdeveloped, substantial improvements are necessary because FinTech will drive business models of the future. Countries must address financial inclusion to build a shared future and to reach poor, low and middle-income consumers with useful financial solutions and having access to financial services. To support financial inclusion, FinTech system such as the effectiveness of credit screening system for investment like P2P lending requires continuous review and improvement, while regulators have the task to regulate FinTech innovations in a way that reduces systemic risks and at the same time also allowing for their further development. Despite the various situational contexts, problems affecting each member of ASEAN countries are relatively similar and they all agree on overcoming and improving practical issues in adopting and developing FinTech innovation. There is no doubt that banks and other financial service providers with large network coverage are key FinTech enablers. They can reduce gaps in FinTech initiatives, and take part in FinTech activities. Yet, financial service providers also need more differentiation to convince consumers about their digital products, and provide incentives to change.

Lagarde (2018) reported that there are about 1.7 billion adults who still live without access to financial services, and EY's FinTech Adoption Index indicated one third of the world uses two or more FinTech services, and 20 percent of them are unaware they are using FinTech (EY, 2017). This opening provides an opportunity for FinTech companies to provide new applications or in partnership with financial institutions to reach out the unbanked and under-banked population, SMEs, and agricultural development in ASEAN. Unleashing the potential of FinTech in financial industry, the impact is greater when cooperation can be fostered among countries to make the FinTech initiative workable into single ASEAN market. Syariah compliant FinTech will also enrich the variants of FinTech products and services to target ASEAN's growing Islamic community and broadening their footprint in Southeast Asia such as Brunei, Malaysia and Indonesia. Overall, FinTech has proved to create impacts on financial inclusion, define and shape the future of the global financial industry which looks stronger than ever.

CONCLUSION

Financial inclusion and skills transfer must be integrated in the development of FinTech in ASEAN. FinTech is still in its early stage, but the landscape has become more crowded. Many of the new players including FinTech startups are competing each other effectively in the realm of soft power. There has been a tremendous surge of interest in FinTech innovative solutions from investors particularly in mobile payments like e-payment and e-wallet. This method of mobile payment is prevalent among millennials and young folks in ASEAN FinTech industry, followed by P2P, crowdfunding and retail investments. There are many practical issues for the proliferation of FinTech in ASEAN such as internet connectivity and mobile penetration rate, most noticeably a change in the way we do things today. Moving away from the traditional banks has begun, and may have been the preferred choice of the SMEs, underbanked and unbanked population. Majority of the population among young and tech-savvy consumers have access to smartphones that effortlessly encourage them to actively participate in FinTech activities. Governments remain the most powerful actors on improving ASEAN FinTech's ecosystem. Finally, FinTech with a digital based platform enables multi-channel financial transactions to an extended pool of market and broadens the delivery of financial services efficiently and effectively from a far distance and yet within reach.

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Chapter 9

Financial Technology and Innovative Financial Inclusion

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ABSTRACT

A portmanteau of financial technology (FinTech) centralizes on the innovative use of smart mobile devices to design and deliver financial services and products, elevating an innovative way of delivering financial services. The chapter mainly focuses on the definition and the importance of FinTech to the financial ecosystem especially in the Southeast Asia region. It focuses on how financial technology (FinTech) came to be, how transactions in the past mostly use cash, and then shifted to credit card and then shifted to a cashless transaction, for example using e-wallet or simply using smartphone for any financial transaction. The research found out how the huge percentage of internet users in the Southeast Asia region were the cause of the development of FinTech companies in the region for FinTech startups. It also showed how FinTech helped to provide solutions for financial inclusion, especially unbanked population.

INTRODUCTION

Financial Technology or better known under the term ‘FinTech’ is widely used in the financial industry. It is in the center of attention as it has many benefits and more convenient to be used. Financial technology develops technological system in the finance industry. The emergence of FinTech companies make an innovation in the industry where the systems become beneficial for general public and even government

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around the world. FinTech keeps improving and attracting investors from all over the world. In 2014, \$12 billion of private capital was invested into FinTech (Gulamhuseinwala, et al, 2015). It offers more user-friendly and convenient ways of managing finance for people in juxtaposition with traditional methods. FinTech industries provide variation of financial services such as Peer to Peer lending, e-payment, holding assets, investments, crowdfunding, insurance services and many more.

FinTech not only focus on the companies but also common people which are the majority of consumers as they use the services for their daily lives. Some of FinTech examples are “cryptocurrencies such as Bitcoin and Ripple, the use of big data for risk analytics, new peer to-peer and other platforms and distributed ledgers for supporting transaction efficiency” (Milne, 2015). Both start-ups and traditional finance companies are active in FinTech where it changes the way traditional institution works such as the interaction with their customers. “Today, FinTech companies directly compete with banks in most areas of the financial sector to sell financial services and solutions to customers which most of us use now” (FinTech Weekly, para. 2).

For the traditional method, we have to go to the bank itself to make a transaction but with FinTech, we can just do it with our mobile phones through mobile online banking. Although we are more used to human interaction, the risk of using machines during the process is lower. Thus, the probability of making mistakes are rarely made (Dhar, 2016). This is also proved by FinTech Weekly (2017) that “especially millennials (people born between approximately the early 80s and late 90s) and the following generations prefer quick and easy banking services over walking to a branch”.

Since FinTech is the product of innovation, technology, business, and economy. The significance of FinTech lies on the movement of technology driven and it will continue to grow bigger especially when technology giants such as Alibaba, Apple, and Google starts to massively introducing FinTech system. It is highly efficient that helps both the individuals and the large corporations FinTech will likely grow larger than what it can be imagined at this stage of time as technology are also improving and growing for the future.

Due to this probability, FinTech is likely to become prominent in the financial sector today and in the future. FinTech provides many privileges compared to traditional financial system. It is important to have background knowledge about FinTech through assessing its meaning and its history.

DEFINITIONS AND SCOPE

There is no concurrence in defining what FinTech exactly is. But many different authors have made attempts to define FinTech according to their own understandings drawn from their conveyed studies and surveys.

Dorfleitner (2017) stated that FinTech represents companies that offer financial services which incorporate advance technologies. Besides providing digital products and services explicitly designed for the banking and financing sector, there are also FinTech that in charge of distributing insurance. These types of FinTech are often called InsurTechs. In addition, it may also offer several of third-party services for instance, providing technical solutions for financial services providers.

According to Schindler (2017), FinTech refers to financial innovation made possible using technology comprising a broad range of services for instance, online marketplace lending, equity crowdfunding and financial applications of machine learning. It is also similar with Arner (2015) who expressed FinTech

as the whole stretch of services offered by finance industry which is greatly supported using advance technology.

There are many forms of FinTech. One example is that FinTech can be found in trading and investing. Nowadays, making an investment are helped or advised by automated financial advisors. According to Anthony Back, Robo-advisors and other startups are utilizing sophisticated algorithms to make trading and investing a fully automated online experience. These automated platforms provides investors big savings and offers financial planning services that are usually given or kept hidden for wealthy investors. Some companies that specialize in this kind of work are such as the Wealthfront and the Betterment. FinTech such as the Robo-advisor in the investment game are potentially replacing traditional non technological advisors with a cheaper and more productive alternative.

Another example is in terms of funding is Crowdfunding. Crowdfunding acts as an alternate source of investments for startups or new businesses who does not have a high capital budget. Anthony Back believes that these startups tend to be not in the interest of big firms or companies. However, with online crowdfunding that raises money in a large amount from different individuals worldwide can fund projects of a new business. Kickstarter and Indiegogo are examples of companies that specialize in online crowdfunding and have manage to be successful. This type of financial technology helps promising ideas to reach an end product. Thailand government has set the direction in moving the nation towards a value-based and innovation-driven economy, wherein crowdfunding is one of the policy mechanisms to support SMEs. It explores the dynamics of financial technology crowdfunding under the policy direction of the so-called Thailand 4.0 (Wonglimpiyarat, 2017).

Another example of FinTech can be found in terms of payments. The most mainstream type of cryptocurrency is known as Bitcoin. Cryptocurrency was designed as a peer-to-peer (P2P) payment network without any intervention from any governing state authorities. The founder of Bitcoin, Nakamoto defined his invention as “A purely peer-to-peer version of electronic cash which would allow online payments to be sent directly from one party to another without going through a financial institution”. In summary, it can be seen at the table 1 below.

Table 1. Types of FinTech

Types	Descriptions
Online banking	Banking activities are done online, for example making payments, transferring money between accounts, monitor accounts, download transactions, handling loan activity, including applications and repayments.
Payments and transactions	Internet-based method of processing economic transactions. Allows accepting payments over the internet. Typically run by third-party corporations, such as PayPal, Google or Click2Pay.
Market trading	The act of buying and selling products on the web. Traders buy and sell using the trading platform. Investors need to provide capital in the hope of financial gain.
Raw materials management	The management ensures that the raw materials are in the range of productivity and the value is on an affordable scale.
Collective financing	It comprises organisational forms which are owned and governed by citizens – sometimes together with municipalities and other institutions.
Development of financial security systems	To manage and secure the systems from any future imbalances.
Digital wallets	An electronic device that allows individuals to make transactions include purchasing items online using the apps available on their mobile phones.
Peer-to-peer investing	Enables individuals to lend money without using an official financial institution as an intermediary.

History of FinTech

The advancement of ICT and the extensive use of smart mobile devices are the enabling factors to financial technology evolution. Technology has always played a key role in the financial sector in ways that most people take for granted and might not ever see. Despite all that, people are still unaware of what FinTech is and where it originated from. Even though FinTech is relatively new, it has existed long before the term has even been created.

Britannica stated that in 1920s, individual firms, such as oil companies and hotel chains, starts to distribute credit card to customers to make a purchase at their each of their business branch. However, the first official universal credit card to be used was introduced by the Diners' Club in 1950s. This makes carrying cash a lot easier in a sense that all the consumers could just bring their cards.

Zerucha (as cited in Truong, 2016, p. 5) believes that with the success of the credit cards, it has led to the creation of other new technology project. One of which is the Automatic Machine Teller (ATM). ATMs was first introduced by Barclays in 1960s. This allowed people to withdraw their money directly from the ATM instead of going to the bank. Even though ATM is quite useful to avoid long queues in banks, it is only sufficient enough to support the financial industry and this does not mean it replaces the banking industry. In the end, banks still held an important role in performing most of the financial transaction.

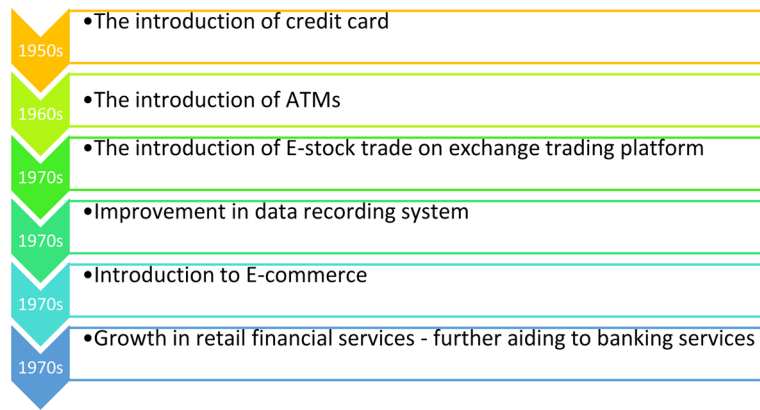
According to Pisani, the first electronic stock market was put into operation by NASDAQ in 1970s (Pisani, 2010). This allowed brokers to buy and sell stocks even after market hours. Moreover, to support the storage of a large amount of data in a safe and optimal way, mainframe computers were installed in most of the financial institutions in the 1980s, further enhanced the agility of financial transaction and supports the implementation of e-commerce.

The booming evolution of FinTech was facilitated by the evolving Internet technology. This exceptional progress of the internet has made a necessary thing for the introduction of a lot of FinTech start-ups in many years later especially Singapore as they are the leading regional FinTech Hub.

Figure 1 below shows brief history of FinTech. Despite the rapid growth of financial technology as we see now, FinTech is nothing new. In fact, the origin could be traced back all the way in 1865, where the invention of pantelegraphy started making a breakthrough in the world of banking. Followed by in the 1800s where consumers started using charge plates and credit coins to exchange goods with merchants. Throughout 1950s and 1960s, modern-day credit card and Automated Teller Machines (ATMs) were introduced – slowly developing the progress of financial services from analogue to digital. Then came along the establishment of the Society of Worldwide Interbank Financial Telecommunications (SWIFT) in the 1973 that has helped to resolve problem relating to international transaction with the means of telecommunication. Furthermore, there has been improvements in record management and financial operation in 1980s. It was noted too this time around there was an increase in online banking as well as E-commerce all through 1990s (Arner, Barberis, & Bukley, 2016).

However, when the global financial crisis fallen on 2007 to 2008, years after came along new innovation in FinTech. This includes the introduction of cryptocurrency like Bitcoin in 2009. Moreover, now in the present serves booming increase in retail financial sectors where online banking could be easily done on mobile phones (Desai, 2015).

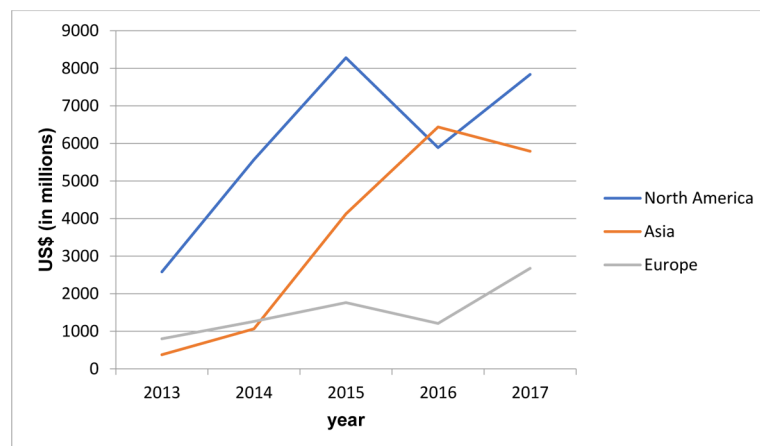
Figure 1. The evolution of FinTech



Trends in FinTech

Figure 2 shows the trend of FinTech funding according to the regions whereas North America received the most funding in general, increasing from 2013 to 2015, from US\$2583M to US\$8281M and decreased in 2016 by US\$2390. Funding for North America increased again in 2017, by US\$1946M from the previous year. Asia is the next most FinTech funded continent – Increasing dramatically from 2013 to 2016 by more 1600%, and decreased for the first time the following year (2017) by 10%. Europe FinTech funding grew over 120% in 2017 from US\$1210M to US\$2676M. Africa, Australia and South America are the least funded continents, with very minimal increase and data throughout.

Figure 2. Trend of FinTech funding
Source: FinTech trends to watch in 2018, 2018



FinTech in South East Asia

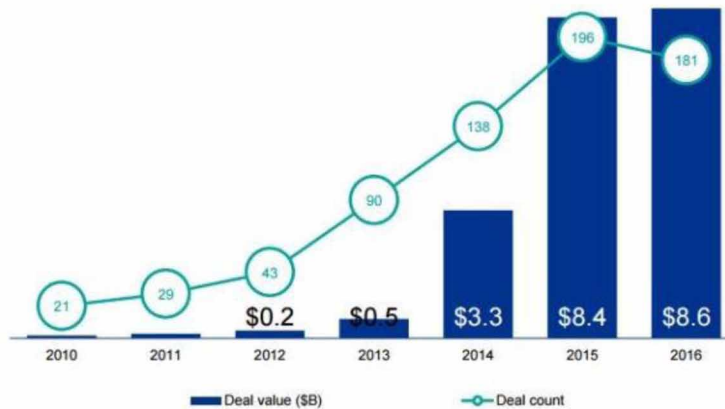
FinTech has become a trend in Southeast Asia in the recent year. This is because FinTech has a potential to solve any problems that affecting the financial environment in these countries. With the situation in Southeast Asia, FinTech has a major impact in the financial area. In Southeast Asia, the financier's region is considered underdeveloped and many countries wanted an improvement through using FinTech system. Before FinTech many things that are difficult can now be achieved by using FinTech. FinTech adoption is fairly a new and recent introduction in ASEAN countries with Thailand and Singapore being its main players in the industry. As stated by Iwasaki (2018), according to a survey done in 2017 by Thai technology media firm Techsauce and market research and consultancy company RUAMKID, Singapore is home to main offices to 43% of FinTech companies in Southeast Asia, followed by Thailand (19%) and Indonesia housing 12% of FinTech companies. Also in the same survey, electronic payment business such as mobile payment service is the leading business for FinTech companies in Southeast Asia with a huge 43%. Compared to the global trend, less than 20% of companies are involved with the electronic payment business according to lists compiled by CB Insights in 2017. This shows that Southeast Asia FinTech business still have a long way to go to compete with the FinTech in Europe/USA. FinTech startups in Southeast Asia is increasing in the past few years. Vietnam-based company, Service, Coins.ph from the Philippines and Funding Society from Singapore are few examples of FinTech startups based in Southeast Asia. The Southeast Asia region have the potential to become the main hub for FinTech startups across the world. As researched by Iwasaki (2018), according to statistics compiled by CB Insights showed that Venture capital investments in FinTech startups in Southeast Asia snowballed from \$11 million in 2012 to \$177 million in 2015 (see Figure 3). The Vietnamese government is developing a national financial inclusion strategy which it plans to issue in 2020. The State Bank of Vietnam (SBV) established its FinTech steering committee and a regulatory sandbox framework that the new framework will allow FinTech companies and financial institutions to test new products and services under SBV's close supervision prior to being introduced to the market (Fintechnews, 2018).

The main technologies and business models used by FinTech companies in Southeast Asia are commonly copied from developed countries and China (Iwasaki, 2018). There is little importance on the originality of the technologies and business models in FinTech and that is why there is many FinTech companies in Southeast Asia that are involved in the same businesses. This is evident in the lists by CB Insights where all countries in Southeast Asia is home to at least one FinTech company specializing in electronic payment business. FinTech business in Southeast Asia adopt a business models which combines both high-tech and low-tech models. For example, in situations where mobile payments are available, those services cannot be fully accessed from mobile devices and must be complemented by ancillary services provided by small retailers.

FinTech is known for its financial services by using technology. There are four characteristics of FinTech that can be seen in Southeast Asia. Firstly, a mobile payment service. This is because it can be used even by people that do not have bank accounts. In addition by using smartphone customer can load money into the accounts for paying cash to connect retailers or other outlets in the local community. Secondly, mobile services allow cash to be transfer using only a mobile phone. Using electronic payments are used as part of their effort to create a domestic infrastructure such as in Thailand and Singapore. Thirdly, transferring cash services to overseas. This is because the services have evolved to meet the demand of a region in which a huge amount of people travel overseas for work. It is easier, cheaper and faster than

Figure 3. FinTech investment in Asia

Source: E27, 2017



the traditional way. Last but not least, lending services based on the use of alternative data. They collect and analyze digital footprints and use this information to compensate for or provide alternative data.

Singapore is the home to the most significant share of FinTech ventures in ASEAN with 39%. The development of financial infrastructure and supportive regulatory policies have positioned Singapore well to compete with other global FinTech hubs such as Hong Kong and London. Indonesia, Malaysia as well as Thailand are fast catching up as preferred FinTech home, supported by high mobile adoption, rising rates of internet penetration and increasingly urban, literate and young population. Singapore has the highest online populations where 74.5% of the population has access to the internet. Followed by Malaysia in second place with 70.9% of the population are fond of the internet. While Thailand is in the last place having 33.9% of the population.

CONCLUSION

In conclusion, the FinTech industry provides the opportunity in transforming the financial sector to be more advanced by providing a variety of business models and market resolutions which will greatly improve financial services in comparison with traditional ways. Furthermore, in consideration with the affluent trends of FinTech in many countries may find it helpful in ruminating to fully embrace FinTech as the primary sector of future financing. FinTech may replace cash payment and ultimately moving towards e-payment, although many may still prefer using cash, with the involvement in e-payment, public may have a wide variety of payment methods. Eventually, becoming a cashless society. As current topics suggest, the FinTech industry does not seem to be deserted anytime soon.

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Section 2

FinTech Companies, Financial Service Transformation, and Adoption of FinTech Into Current Business Models

Chapter 10

The New Financial System: A Revolution Made by Fintechs

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Fundação Dom Cabral, Brazil

ABSTRACT

This chapter shows the revolution that is happening in the financial system, having as main actor the technological companies—the fintechs—that don't have financial knowhow. The traditional banks didn't structure their business trying to attend the client's needs. The clients always suited themselves to banks' services. The fintechs are changing this reality by putting the client in another baseline, filling the gaps left by the banks, offering new services, and acting in places where banks have never gone before. The fintechs are offering these services with a lower price and more quality for the clients.

INTRODUCTION

This chapter aims to motivate the discussion about a huge revolution in financial system that is happening right now. Banks have always acted in society as the key agents in the intermediation of financial transactions. Since their inception, they have been important pieces for the economic development of the world, ensuring security and care of the money of people and nations.

After the crisis of 2008, generated by the neglect of the current financial system, the supremacy of the banks have become questioned. Moreover, the institutions did not evolve like other economic segments. Banks have continued to be bureaucratic, charging high rates for services and barely meeting customer needs. Most people consider going to the bank an unpleasant activity.

Fintechs are taking advantage of the abyss between the needs of customers and the services effectively provided by the banks to revolutionize the financial system as we know. The chapter will address the beginning of the global financial system, the economic crisis of 2008, followed by the challenges faced by the banks in the current scenario. Subsequently, it will be approached what are fintechs, their different segments, the unprecedented revolution that they are driving in the financial system and traditional banks reaction.

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THE BEGINNING OF FINANCIAL SYSTEM

The banks are fundamental agents in the economic development of the nation. They are the financial intermediation between the population and the Central Bank.

The first banks were created in XVII century, in Europe. Due the expansion of the trade by the bourgeoisie, there was a need to keep the coins in somewhere safe. Since the bourgeoisie traveled for long distances, as they went about selling their wares, they accumulated more and more coins and it was dangerous to travel with large sums of money.

In this way, the bourgeois handed the coins to the bank, which gave them a paper as guarantee. After the presentation of this paper, the banks returned the coins. Over time, this paper began to be accepted as the bargaining chip in financial transactions.

The bourgeoisie restructured trade and integrated the regions which had so far lived only within their fiefs, propelling the end of the feudal period.

The activities of the banks provided security for the bourgeoisie and for people who had money beyond what was necessary for survival. This was paramount for the evolution of the trade and the development of the worldwide economy as we know it today.

Since then, the way that business were accomplished, has changed completely. Banks began to participate in most of the world's commercial and financial transactions, taking care of the money of individuals and nations. Always being considered as secure institutions, and often adding credibility to the transaction itself, just because they are involved in.

BRAZILIAN BANK SYSTEM

In Brazil, the predominant financial institutions are the multiple banks that operate in several segments of the financial market, collecting deposits / savings, and intermediating credit and financial security transactions (Freaza, Guedes and Gomes, 2008).

The profitability of Brazilian banks has grown in recent years, according to Arienti (2007). The author says that the degree of profitability - the proportion of net income to shareholders' equity - that measures the capacity to generate income for shareholders on invested capital has increased in the country, as can be seen in the table 1 below.

Table 1. Percentage of profitability from Brazilian banks*

Year	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Profitability	14.4	11.9	12.3	8.5	16.3	23.0	19.2	19.2	27.0	14.7

*Author's note: Banks selected until 1999 were América do Sul, Bandeirantes, BCN, Boavista, Bradesco, HSBC, Bamerindus, Itaú, Mercantil de São Paulo, Noroeste e Unibanco, after 2000 were Bradesco, Unibanco, Itaú, Safra, HSBC, Bank Boston, Citibank e ABN AMBRO.

Source: ARIENTI F. F. P. Reestruturação e consolidação do sistema bancário privado brasileiro, Ensaio FEE, Porto Alegre, v. 28, n. 2, p. 577-600, out. 2007.

The New Financial System

Table 1 shows that, in 2002, the percentage of profitability reached the mark of 27%, the record of the period. Despite the fall in profitability in 2003 to 14.7%, this percentage is still higher than the profitability at the beginning of the analyzed period, 14.4% in 1994. In summary, Brazilian banks continue to perform very well even with all competition in the sector and also after the entry of foreign banks into the national market, which took place between 1996 and 1998.

According to the Bank for International Settlements (BIS) annual report, Brazilian banks are the most profitable in the world, even with all the economic problems that the country is facing to, as shown in the Table 2.

Table 2. Profitability of major banks* (as a percentage of total assets)

Country	Net income			Net interest income			Fees and commissions**		
	2012-14	2015	2016	2012-14	2015	2016	2012-14	2015	2016
Japan (5)	0.61	0.60	0.52	0.79	0.74	0.68	0.46	0.46	0.45
United States (10)	1.12	1.40	1.36	2.27	2.24	2.25	1.31	1.24	1.15
France (4)	0.25	0.42	0.42	0.87	0.85	0.84	0.35	0.39	0.36
Germany (4)	0.12	(0.12)	0.03	0.92	1.01	0.97	0.62	0.70	0.68
Italy (4)	(0.46)	0.29	(0.67)	1.46	1.30	1.21	0.88	0.85	0.84
Spain (6)	0.06	0.57	0.53	1.97	2.04	2.03	0.67	0.64	0.66
Australia (4)	1.24	1.25	1.17	1.78	1.62	1.73	0.43	0.38	0.39
Canada (6)	1.05	0.97	0.97	1.63	1.51	1.54	0.72	0.72	0.72
Sweden (4)	0.73	0.80	0.78	0.91	0.88	0.87	0.44	0.52	0.51
Switzerland (3)	0.23	0.17	0.11	0.70	0.88	0.78	1.31	1.48	1.40
United Kingdom (6)	0.26	0.27	0.22	1.06	1.25	1.15	0.49	0.49	0.44
Brazil (3)	1.57	0.67	1.99	3.33	2.09	3.22	1.82	1.76	1.86
China (4)	1.65	1.50	1.34	2.41	2.30	1.92	0.61	0.57	0.53
India (2)	1.67	1.57	0.56	2.64	2.74	2.56	0.76	0.76	0.71
Korea (5)	0.62	0.60	0.63	1.92	1.72	1.67	0.41	0.40	0.36
Russia (3)	1.79	0.63	1.86	3.87	2.98	4.44	0.88	0.89	1.04

Author's note: Number of banks in parentheses. The first column per category shows the corresponding simple average over the period 2012–14.

*The calculation of total assets may differ across banks due to different accounting rules (eg netting of derivatives positions).

**Net fee and commission income.

Source: BIS (2017)

In 2016, the net result of the Brazilian financial institutions was 1.99%, the highest percentage among all the countries analyzed. Russia came in the second position with 1.86%, followed by the United States with 1.36%.

The second column of the table shows net interest income: in 2016, Russia led the ranking with 4.4%, followed by Brazil with 3.22%. India achieved interest income of 2.56%, a much lower percentage when compared to Brazil. Reminding that, like Brazil, India is also a developing country.

It is important to note that the high margins charged by banks in credit operations suppress the demand for financial resources, reducing investments and consumption, and increase the financial exclusion of a large portion of society.

Finally, the third column shows data on profits through the fees charged for the services rendered. Brazil, once again, leads the ranking with 1.86%, the second position is occupied by Switzerland with 1.40%, followed by the United States with 1.15%. The bank fees charged by banks in Brazil are the highest in the world.

FINANCIAL CRISIS OF 2008

The financial crisis of 2008 began in the United States and took such a large proportion, which is considered the biggest crisis since the Great Depression in 1929. This financial crisis, also called the subprime crisis, was generated by the lack of regulation of the banks. People mortgaged their homes and, with mortgages, they bought another property that was often mortgaged, capturing more money. In addition, interest rates were very low during this time, so people became too indebted.

The banks took on low-risk debt plus high-risk debt and made up a new product for the financial market, the CDO (Collateralized Debt Obligation). These CDOs were sold in Europe and the United States. They had a high return and excellent rating from risk rating agencies, ensuring that the CDOs were safe and had a very high quality.

Whereas that, market interest rates were low, these new bonds were very attractive to investors. In addition, they had a high rating from reputable risk rating agencies, such as Moody's and Standard & Poor's, maximizing the product quality.

However, if something is certain in economics, is that as more secure an investment is, the lower its return. Now, if the market interest rate was low, how could a "safe" investment generate such a high return?

In that period, optimism reigned in the financial market and the banks have never made so much profit before, so they paid million-dollar bonuses to their financial managers. That is why many economists say that it was the remuneration policies of managers that generated the 2008 financial crisis. But if the bankers' million-dollar bonuses were not the drivers of the crisis, they certainly were potentiators of it.

On September 15th, 2008, the Federal Reserve (FED), the United States' Central Bank, refused to redeem the Lehman Brothers bank. From then on, the crisis of confidence was established in the world financial system. There was panic in the financial market, the credit was almost extinct and the investors were seeking liquidity. There was a drop in the worldwide production and trade. The crisis spread throughout the world in very few months.

Even Brazil, which was experiencing a very solid economic period at the time, also felt the effects of the subprime crisis. On September 29th, 2008, after a 10% drop in the stock market index, the Bovespa triggered the circuit break, a mechanism that interrupts movements in the stock market for 30 minutes. It had been 10 years since the last time the circuit break was triggered.

In Brazil, credit was scarce, economic activity was reduced. According to IBGE (2007), the Brazilian Gross Domestic Product (GDP) was 6.10% in 2007, after the crisis of 2008, the country closed the year with GDP of 5.10% and in the following year, 2009, the GDP fell to -0.10%.

The governments of the affected nations adopted expansionary fiscal and monetary policies in order to minimize the impact of the real estate bubble. In the United States, there was a reduction of the short-term interest rate in order to encourage consumption and investment. In China, the government has increased public investment. In Brazil, there was a reduction in interest rates, a reduction in taxes, an increase in the minimum wage and an increase in public investment. However, the effects of the

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crisis were felt aggressively by the productive sector, resulting in a reduction of GDP, as explained in the previous paragraph.

The effects of this crisis have been felt in different ways around the world, putting at stake the structure of the American and global financial system, its risks and the regulation mechanisms of it. It is a fact that the lack of regulation of the financial system, on the part of the FED and the negligence of the agencies of classification of risk, caused this crisis. From that moment, the supremacy of the banks came to be questioned by the society.

CHALLENGES OF WORLD BANK SYSTEM

In recent years, the dynamics of the business environment of banks in the world have been changing. Globalization, together with the rise of the internet and the popularization of access, have made the world connect at a daunting speed.

People know what happens anywhere in the world in real time. Events which happened within a company that have its stock in the stock market, for example, imply changes in the price of its shares, in the actions of its suppliers, competitors and customers, the stakeholders are impacted simultaneously and instantly.

All these factors are creating a new competitive landscape in the global financial system, raising concerns for financial organizations. It is well known that capital has great mobility, especially the speculative one. Geographical boundaries are no longer a hindrance to investing in other nations.

In the 1980s, most of the banking services were carried out only in the cashier, during business hours. Going to the bank was almost a ritual in which you would spend a lot of time waiting in the queue to solve an issue with a cashier help.

However, even with all the technological upgrading the banks have been experiencing in recent years, such as the deployment of internet banking, ATMs and mobile applications, some services can only be performed by the account owner in his own bank branch with his manager, like we were in the 80's.

Most people who work have a hard time going to the bank during business hours. It is a painful task, a lot of time is spent and, usually, the clients feel that these trips to the bank, besides being a disorder, are a waste of time.

People who used banking services in the 1970s and 1980s see that the banks have improved a lot. However, there is a part of the population that does not perceive any improvement: the generation Y. Such a generation is in a hurry to carry out all its activities, they hate to wait, they want to be everywhere all the time. For these individuals, banks are overpast.

The generation Y is made up of adults between 20 and 31 years old, they did not grow with the internet, it became popular when they were teenagers. But, they have learned to use it and, today, they don't live without it. These individuals hate the banking bureaucracy.

From this, it is possible to imagine the shock that the generation Z (young people who are between 12 and 19 years old, also known like generation of the Internet) will have when using the traditional banking system. These individuals are already born with the internet age. This is the generation that, before learning to speak, had already used cell phones and tablets to play. These people will be the future banks' clients.

THE FINTECHS

Banking services have always been fundamental to economic development. However, after the 2008 crisis, bank supremacy became heavily questioned and people reduced confidence in them.

It is a fact that financial services are essential for society and for the economy as a whole, but they should not necessarily be provided by banks. From this idea came the fintechs.

Fintechs are financial startups focused on the application of technology to provide financial services. Generally, each fintech provides a specific service, different from the banks that offer a big portfolio. In this way, fintechs can offer the services at a lower cost than the banks and with higher quality. That is, fintechs provide customers with features and tools that banks do not offer or, when offer, they are obsolete.

Customers sees the fintechs as facilitating companies, without bureaucracy and with lower costs, unlike the experience many people have with banks. For customers, the service options offered by fintechs are viable and even better than those offered by the traditional financial market. The following will address the different types of fintechs.

MEANS OF PAYMENT

The consumers can choose to pay their purchases with the traditional debit / credit card from retail banks or via PayPal - payment company. According to Barberis and Chishti (2017), PayPal has 100 million active accounts, making about \$ 315 million in payments per day. Although the fintech concept looks very modern, Paypal started its activities in 1998.

In turn, RecargaPay is a fintech that has emerged as an application for recharging phone credits and is currently a means of payment platform. The application allows the user to program recharges from time to time in his cell phone. It is also possible to recharge the public transport ticket and to pay the bills through the cell phone, avoiding queues and without the need to have a bank account. These tools work just as well as money or card. Recarga Pay has 5 million users and received investment of R\$16 million in September 2017 from TheVentureCity, an American startup accelerator.

Controly is a startup that offers international prepaid credit card. With a Controly application, the customer checks their balance, checks their spending history and generates a bill to recharge their card. The big differential of this startup is to help the client achieve goals. Through the tools offered by startup, the customer can create a goal and reserve part of their monthly balance to achieve their desire, whether traveling or buying some property or product. Furthermore, with the prepaid card there is no need to prove income. On that way, people who could never get a credit card can enjoy the benefits of it, such as the security of carrying a smaller amount of money, for example.

Nubank is a Brazilian fintech, started in 2013 and acts as a credit and debit card provider. The customer does not pay annuity nor tariffs, therefore, the startup profits with percentage on the purchases and interest of the card. Such interest rates are slightly lower than those practiced by traditional banks. The company has no agency and the card is managed by the customer, who can follow the invoice situation in real time via the application.

This fintech allows the customer to monitor their expenses and be served by the company via the application. Through the application the user can request increase or reduction of the limit of his card and visualize in real time his expenses in the month. The expenses are made available through a time

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line, including the location on the company map. It is believed that, by this way, the customer has greater control of his expenses, avoiding default at the end of the month.

[...] Nubank has already received 5.5 million credit card applications - of that total, one part was issued, one refused, and a third (500 thousand people) forms a waiting line for credit analysis. [...] Nubank does not reveal the exact number of active customers, but industry experts and startup partners estimate something around 700,000 to 800,000, an important number if we take into account the age of the company and the fact that she does not even spend a penny on marketing. (OLIVEIRA, 2017)

According to Oliveira (2017), Nubank has about 800 thousand customers, its base has grown from 20% to 30% per month, and the card has already been used in more than 60 countries. These numbers represent an astronomical growth, even for a startup who are famous for growing exponentially.

Nubank also provides discount to customers who want to anticipated pay their parcelated accounts, something innovative in the credit card market. In addition, interest rates are around 7% per month, versus 14% per month on average in the Brazilian market. The following table shows the credit card interest rates practiced by Brazilian institutions.

Table 3. Interest rate of revolving credit cards in Brazil

Institution	Interest Rates	
	% per month	% per year
BANCO PAN	8.11	154.81
BANCOOB	8.51	166.50
FIN. ITAÚ CBD CFI	9.30	190.74
BCO SANTANDER (BRASIL) S.A.	9.50	197.04
BANCO BRADESCARD	9.65	201.97
BCO DO NORDESTE DO BRASIL S.A.	9.70	203.82
ITAÚ UNIBANCO BM S.A.	9.95	212.29
BCO DO BRASIL S.A.	10.00	214.01
BCO BRADESCO CARTOES S.A.	10.10	217.15
BANCO CBSS	10.13	218.38
BCO BRADESCO S.A.	10.20	220.63
BCO CITIBANK S.A.	10.20	220.67
PORTOSEG S.A. CFI	10.40	227.80
LUIZACRED S.A. SOC CFI	10.54	232.78
CAIXA ECONOMICA FEDERAL	10.60	235.08
BCO SAFRA S.A.	12.69	319.29
BANCO ORIGINAL	12.71	320.16
BV FINANCEIRA S.A. CFI	13.68	365.59
PERNAMBUCANAS FINANC S.A. CFI	17.05	561.38
BCO LOSANGO S.A.	17.80	614.11
BCO TRIANGULO S.A.	19.99	790.52
DACASA FINANCEIRA S/A – SCFI	20.00	791.18

Source: Banco Central do Brasil (2017)

As can be seen in Table 3, credit card interest rates in Brazil vary from 154% to 790% per year. The financial institution that charges the highest interest rate is Da Casa Financeira, and the smallest is Pan Bank.

Generally, those who suffer the most with these abusive rates interests are the poorest part of the population, who cannot afford the full payment of the bill, or only get credit in financial institutions that charge the highest interest rates in the market.

Nowadays, traditional banks come in contact with the customer, insisting to them to parcel the credit card bill, of course with an abusive rate of interest. The banks leave the impression that they want people in debt and with their finances disorganized to profit from it. The customers have the feeling that banks are always against them. Fintechs, in turn, are showing that they can make life easier for clients and help them even with financial management.

As explained, “new” means of payment work as well as money or card from traditional banks. And gradually, they are transforming the form of payment as we know it.

FINANCIAL MANAGEMENT

In addition to fintechs charging less for the services provided to customers, there are fintechs in the market to aid financial management. An example, is the Brazilian startup GuiaBolso, which has a tool for personal financial management.

The app accesses the user’s bank account, showing monthly entries and expenses. The user can categorize the expenses in order to improve the management of the expenses. In this way, the tool consolidates expenses with supermarkets, bars / restaurants, transportation, etc. So, the user can set spending targets for the next month and monitor their performance over the period, in addition, planning investments, travel, etc.

The company guarantees that the information is kept confidential. It is important to point out that all this functionality is available 24 hours a day, via smartphone. GuiaBolso received an investment of around 125 million reais in October 2017 (Prado, 2017), currently the application has 3.5 million of users.

In turn, the fintech Minhas Economias is also a financial management platform, which allows the user to view expenses by category, similar to GuiaBolso. But this application allows to register multiple cards and offers the possibility to export all the information to Excel. However, the user income must be manually entered. Information can be accessed at any time, via computer or smartphone.

The Organizze application has 1 million users and also has the purpose to assist in financial management. In this tool, the user informs the balance of his account, credit cards, due dates of bills and, later, informs manually his diary expenses and its revenues. A differential of this application is the SMS reading of the banks in order to monitor the expenses and prevent blows.

In addition, the Organizze warns the user when accounts are expiring, regularly post personal finance articles on your blog to “educate” users financially, making them aware of the importance of financial management. Organizze has a business version, but for this version the company charges monthly subscription for use of the tool, it is possible to test it for 30 days before signing.

PEER-TO-PEER LENDING (P2P)

The way of making loans has also been altered by financial startups. Traditionally, banks raise money and lend it to the market at a much higher interest rate than they pay to the money owner.

Peer-to-peer lending (P2P) platforms unite people who want to lend to those who need money. This type of loan has been moving billions of dollars a year around the world.

Peer-to-peer loans represent a market of roughly \$ 65 billion globally. The mode is very successful in countries such as the United States and England, where even public banks invest in small and medium-sized companies. (Merker, 2016)

Those loans have lower interest rates than those charged by commercial banks, and it works as follows: the borrower gets the money with less bureaucracy and the owner of the capital gets a good return on the money. On average, P2P loans cost about 50% less than in banks.

In this way, banking intermediation is no longer necessary for the transaction to take place without any detriment to the provision of the service or customer satisfaction.

Traditional banks raise funds through savings and certificate of deposit (CD in the US, in Brazil it is called CBD) and lend this capital in the market with very high spread. According to Merker apud Gomes (2016), the Brazilian spread is the second largest in the world.

Bank spread consists of the difference between the interest rate on the borrowed capital and the interest rate on the money raised, as can be seen in the following formula.

Bank spread = interest rate - return rate

Commercial banks are profiting from loans in Brazil, due to the fact that the country has the second largest bank spread in the world and low default rates. For this reason, Brazilian banks continue to profit even in times of crisis. Table 4 shows the ranking of Bovespa companies with the highest profits in the third half of 2017. It is possible to observe that banks are the institutions that appear at the top.

Table 4. Companies with the highest profits in the second quarter of 2017 among Bovespa companies

Company	Sector	Net Profit R\$ (000)		
		2016	2017	Variation
ItauUnibanco	Banks	5,518,457	6,013,965	495,508
Bradesco	Banks	4,133,898	3,911,483	- 222,415
Brasil	Banks	2,465,048	2,618,682	153,634
Ambev S/A	Food and drinks	2,046,154	2,013,148	- 33,006
Santander BR	Banks	1,347,366	1,879,466	532,100

Source: G1 apud *Econômica*, 2017.

In Brazil, this type of P2P loan is still new. Nexxos is a Brazilian and Paraguayan Fintech that operates in the collective loans market. It was founded in 2015 and has already financed 23 million reais in loans. Investors who lend their funds receive the interest monthly in their bank account.

To apply for a loan, the user must sign up for the platform. After reviewing the request made by Nexxos, the request may be approved or rejected. If the loan application is approved, it is made available on the company's platform. Thus, investors visualize every opportunity and choose which they wish to invest in. When 100% of the capital has been withdrawn, the amount will be passed to the application, who will pay interest and the amount received in subsequent months.

Interest to owners of capital varies between 15% and 25% per year. However, it is important to note that there is a risk of default, so the investor is advised to evaluate the risks and diversify their investments.

The world's first fintech peer to peer was Zopa, who was born in London in 2005, and has loaned about 1.5 billion pounds since its inception (Fintechnews Switzerland, 2016). The startup slogan is "We believe a loan should be there to help you, do not hold you back."

The English capital is considered one of the best places for fintechs development in the world. The ease with which business can be established is a reflection of government measures to encourage entrepreneurship and innovation.

The Finding Circle is also a significant player in the European P2P market. The startup emerged in 2010 in the United Kingdom and has already funded 1 billion pounds for small and medium-sized businesses (Fintechnews Switzerland, 2016).

Lending Club is one of the largest P2P fintechs in the world, founded in 2007 and headquartered in San Francisco, United States. The startup is considered the largest player in the west and captured about 9 billion dollars in 2014 (Gomes, 2015).

According to Lending Club Statistics (2018), a startup website, until December 2017, it lent 34 billion of dollars. Fintech lends amounts between 1,000 and 40,000 dollars, and loans can be financed in up to 5 years (Jayakumar, 2018).

The fintech that stands out in Israel in the loan segment is Blender, founded in 2014 and already present in several countries.

The fintechs peer to peer played a crucial role in 2008. Due to the crisis of confidence generated by the US housing crisis, securing funds from the banks was a rather arduous task. Today, P2Ps are viewed by customers as partner companies, as well as other types of fintechs. In addition, getting loans with interest lower than those practiced by banks safely and with less bureaucracy is the desire of every client.

The operation is also advantageous for the investor who achieves a higher rate of return on his asset, but it is important to know that there is a risk of default.

In Brazil, there is a fintech that offers almost all the services provided by a traditional bank: The Neon bank. This bank, exclusively online, was founded in 2016 and has 120 employees and 100,000 customers. Access to the account is given via application. There is no monthly fee and there is no physical agency. The bank's slogan is "Like a bank, but totally different." The client has checking account, debit and credit card, possibility to make investments and to make loans, as in any bank.

The neon bank arised because its founder, Pedro Conrade, was dissatisfied with the service of his bank and identified a gap in the market. Unlike traditional bankers, he has only one suit and no business card. It is intended to capture dissatisfied customers with other banks.

The focus of the Neon bank is to attract mainly the young people. To open an account, you must be over 18 years old, have CPF and download the bank application, and to activate the account, you need to deposit 100 reais. The bank does not charge fees as long as the customer makes only one withdrawal

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and one bank transfer per month. For quantities above these transactions, fees are required. The bank also offers biometric recognition service by digital or selfie. In addition, customers are guided to save to achieve goals, with guidelines through the application chat.

Neon follows the rules and requirements of the Central Bank of Brazil and is covered by the Credit Guarantee Fund. In other words, if there is any problem with the bank and it loses the capacity to honor its commitments, the customer receives up to 250 thousand reais of his money existing in the institution.

A survey by EY consultancy, made with 55,000 bank customers in 32 countries, shows that only a quarter of them believe managers give unbiased advice on financial products. [...] Bank aversion is partly due to the fact that being a client of them is not a choice but an obligation for any ordinary citizen who needs to pay bills, receive and transfer money, etc. (Bertão, 2017)

Fintechs are reducing the cost of financial products / transactions, making daily financial issues easier for customers, delivering quality services and even financial management platforms.

THE REVOLUTION OF WORLDWIDE FINANCIAL SYSTEM

Fintechs are revolutionizing the way individuals conduct their financial transactions in the world. As described earlier, fintech's largest hub is located in London, a city that provides an environment conducive to innovation.

Switzerland has also created a favorable space for fintechs. The European country encourages them precisely because it is known worldwide for its banks and for the quality of the services offered.

Israel has a significant pole of innovation, matching the other European poles as well as the United States. In Israel, the government supports startups by funding R&D areas and creating a favorable environment for innovation.

The investment of Venture Capital funds in Israeli startups (per capita) is 2.5 times higher than in Silicon Valley and 30 times higher than in Europe. On Nasdaq, there are more IPOs from Israeli companies than from all the countries of Europe combined. (Finnovation, 2016)

Brazil stands out as a pole among the countries of Latin America. It is important to note that in Brazil the fintechs are regulated by the Superintendent of Private Insurance, Securities Commission and Central Bank.

As we have seen previously, the crisis of 2008 was generated by lack of regulation. So, the regulation of financial transactions is essential to keep the financial system healthy and avoid another crisis of confidence in the financial market.

Developing countries with very little financial infrastructure are the target of fintechs. In these countries, millions of people do not have a bank account, they have never been clients of a bank. In turn, in the more developed countries, fintechs fight with banks for customers.

Most of these developing markets are not attractive to commercial banks due to their high operating costs, as well as the difficulty of geographical coverage that a regular bank has. The fintechs, in turn, has a much greater scope because, for an application to be used by an individual, it is enough that he has a smartphone or even a regular cell phone.

According to the International Telecommunication Union, an estimated 95.5% of the world's population has access to a cell phone - which gives SMS a greater impact than the internet. (Barberis and Chishti 2017)

According to Barberis and Chrishti (2017), it is estimated that, by 2020, 70% of individuals in developing countries will have a smartphone. From there, the opportunities for fintechs will be immense. The financial startups can become the agents that allow access and direct financial resources to those who need it most. Generating huge social inclusion for those who have always been excluded by banks.

Over the past 15 years, mobile phone penetration in Africa has gone from zero to 900 million subscribers [...]. More impressive is the fact that about 500 million of these subscribers do not have regular access to electricity. (Barberis and Chrishti, 2017)

An interesting factor is that the fintech market in Kenya is very well developed, even more developed than in rich countries. This happened because the Fintechs in Kenya came up to serve the bankless, who are millions of individuals who never had a bank account and carried out all financial operations with cash. Traditional banks did not reach these individuals, and there was no barriers to fintech's development. The services offered by fintechs were so successful, that people who had banks started using fintechs and asking those same services to their banks.

In poorer countries there is no need to compete for clients, the market is large and very lacking in financial services. Most transactions take place in cash. Fintechs are facilitating the lives of people from these localities and generating social inclusion for the population.

[...] only 50% of the people in the world have a savings account, and only 20% have access to a loan product from a financial institution. There are approximately five billion people that banks do not currently served. (Barberis and Chishti 2017)

It is hard to believe that so many people still do not have access to the banking system, even with all the evolution that we have experienced in recent years. Moreover, among the people who have access to the banks, much of it is not satisfied.

Unfortunately, the percentage of individuals with access to loans is also very low. The loans having the power to transform society and generate social inclusion. Small entrepreneurs, for example, need investment to be able to develop their business. The poorest people need access to credit with fair interest rates but, unfortunately, these people get only financial loans at abusive interest rates.

Muhammad Yunus won the Nobel Prize in 2016 for setting up a bank to offer microcredit to poorer people, the Grameen Bank. The purpose of this bank is the eradication of poverty in the world. The institution offers credit to poor people without the guarantees required by traditional banks. The default rate is negligible, and the vast majority of clients are women. This is just one example of how it is necessary to provide loans to the low-income population. It is important to make it clear that Grameen Bank is not a fintech.

Traditional banks have developed, along with bureaucracy and high rates of services, a certain formality. All the people who work in the banks are always well dressed, they wear suits and tailleur, which ends up intimidating some clients, especially the poorest ones. Many people are ashamed to go to the

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bank poorly dressed or shortly after they leave work because, sometimes, they are dirty. Bank employees often misbehave these people, and they feel uncomfortable with the looks of customers.

Thereby, going to the bank has become an unpleasant activity, people want to leave the place fast. That is terrible for a place that sells services and needs customers.

It is a fact that banks have never structured their business thinking about the customer. The customers have always been the responsible for adapting to the services that the banks have offered. Fintechs are changing that reality by putting customers on another level. Fintechs are developed to quickly adapt to the market changes and customer needs.

Another aggravating factor against banks is their opening hours. The banks operate at reduced hours, which makes it difficult for the general public to access, who are working during this period.

Fintechs, however, offer the same services at a lower cost, run 24 hours a day. The access can be made anywhere, via smartphone or mobile phone, providing social inclusion and broadening the scope of services provided. Fintech's focus is on customers. The purpose of these companies is to facilitate the financial transactions in the day to day of customers.

After the financial crisis of 2008, people began to take better care of their finances. Fintechs provide tools for this control. The world economic situation is making people more cautious above their spending. About 200 million people are unemployed in the world (Castro, 2017). Faced with this global situation, it is impossible to stop taking care of finances.

According to a report by Accenture apud Kudinska and Románova (2017), investments in Fintech were 15 billion dollars in 2015, against 4 billion dollars in 2013.

Banks will likely lose market share, reduce margins on products offered. Banks are likely to become more efficient, try to add value to products, and seek to adapt to changing market conditions.

RECOMMENDATIONS FOR THE TRADITIONAL FINANCIAL SYSTEM

Faced with the space in the financial market that Fintechs has been gaining in recent years, it is natural to expect a reaction from the traditional banking system. The banks could choose to enter the fray against fintechs, but this would not be a reasonably interesting route. A feasible and smart alternative would be to follow the fintechs in this revolution, taking the opportunity to improve the quality of banking system services.

As the commercial banks have a large database and experience, a possible repositioning in the value chain would open up the possibility that they may become providers of Fintech's financial solutions. Another reason to invest in strengthening a partnership would be to use Fintech's technological know-how to improve banking services. Therefore, banks would remain efficient and competitive players in the global financial market, instead of being obsolete service providers.

Some banks have already realized that the financial market revolution is being written before them and have chosen not to miss the opportunity. They are investing in technological innovations, setting up incubators and partnering with fintechs to participate in this transformation.

A great example in Brazil is Itaú, which created Cubo, a financial services platform developed in partnership with startups. In turn, Bradesco created InovaBra, with the aim of promoting synergy between startups, bank and investors.

However, the responses of the traditional banking system go beyond partnerships. The same banks that partner with fintechs are also creating difficulties for them. Recently, Nubank has accused some

Brazilian banks of creating barriers to hinder the issuance of credit cards by new agents. Traditional banks would be hampering Nubank's hiring of banking services necessary for its activity. As discussed in the chapter, since Fintechs specialize in a given service, they must hire services from other agents, including banks. Nubank filed an administrative proceeding with the Brazilian antitrust agency CADE (Administrative Council for Economic Defense).

On April 2018, the Brazilian National Monetary Council approved a group of rules which turns the fintechs more independent of the traditional banking system. Prior to the adoption of these regulations, fintechs needed to be linked to large banks to offer payment accounts to their customers.

With this regulation, fintechs are now defined as Direct Credit Societies or Personal Loan Companies, which will make it possible to use their own resources for loans, financing, acquisition of credit rights and for the aforementioned peer-to-peer.

According to Matsu (2018), the Central Bank's main objective with such a resolution is to increase competition so that interest rates are effectively reduced. Today, the four largest banks in Brazil hold 78% of the loans.

Without doubt, the regulation will create a favorable environment for the development of fintechs in the country. In return, startups will have to adapt to meet the operational requirements according to their respective profiles.

CONCLUSION

In recent years, technology has transformed the way of people consume, travel, book hotels, communicate, relate, inform, study, teach, and so on. Now, that change has come in providing financial services.

For decades, banks competed only with each other, there were no big news in the financial segment. Now, the banks are competing with innovative organizations that grow exponentially and are revolutionizing the traditional way of delivering services.

Financial startups have a competitive advantage by focusing only on a specific area in the development of a specific service for the purpose of becoming a benchmark in this sector, rather than competing at all levels as traditional banks do.

Fintechs have identified a huge gap in the market, between what banks offer and what customers really want to. And they are turning that customer dissatisfaction into an exponential business opportunity. We are experiencing an unprecedented financial revolution that is not being undertaken by traditional financial institutions, but by technology companies that have no financial know-how but do something that banks never did: they put the customer in the first position.

Over time, the costs of changing financial institutions will be reduced, so the banks will have to compete solely on the prices and quality of services provided to maintain their customers.

It is necessary that governments start to regulate fintechs. Fintechs are not banks, but they are acting like financial institutions. As it was shown in the beginning of this chapter, financial institutions need to be regulated. The lack of regulation could trigger major financial crisis, that would spread quickly all over the world.

The consequences of this revolution in the financial market are still obscure, but there is no doubt that we are experiencing a period of disruption of the status quo of the traditional financial organization.

For the next studies, it is suggested that more research be done on the evolution of fintechs in the face of the financial market, mechanisms for regulating their activities and interfacing with the tradi-

tional banking system. It would be also vital to investigate further the improvement of social inclusion in developing countries, generated by the fintechs.

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Chapter 11

Digitalisation of the Global FinTech Industry

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ABSTRACT

The digitalisation of global financial technology and marketing is central for the success of many banking organisations across the globe. Digital disruption is a change that occurs when new emerging digital technologies and business models affect the value proposition of existing goods and services for low end demanding customers or for new market customers. Digital banking or online or virtual banking is leading to the digitization of all the traditional banking activities, products, process, or services. It is needless to state that mere adaptation of digital media to comply with trends does not guarantee success. The digital trends in the banking industry has seen banks focusing on digitalization core processes, increasing awareness, financial inclusions, and undertaking sustainable practices. FinTech (i.e., financial technology) is competing with traditional financial methods in the delivery of financial services and reaching the unbanked segment of society, particularly in developing countries. There is a strong need to understand drivers and trends in the FinTech industry.

INTRODUCTION

With an increase in technological advancement, we are witnessing drastic changes across numerous disciplines that is disrupting the conventional means of doing business, practices or a general course of action in given scenarios; the digital advancement has become so rapid, that vast majority of innovations go unnoticed (Canales, 2018). In the light of convenience, the technological advancement has brought along, the word ‘Digital’ has become an indispensable element of our life. From latest gadgets that didn’t exist two decades ago to applications facilitating online conferences, essentially connecting

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people from different continents, to digital watching monitoring pulse and stress level, all these not only eliminate hassle but provide avenue for businesses to align themselves and make most the most out of it to maximize the success of their respective businesses.

The new innovations and technologies are disrupting existing industrial structures and leading to the disappearance of some industries and also the evolution of new industries. The disruption has to lead to disappearances of fax machines, real based cameras, floppy disks etc. and the digital output, digital prints cloud storage and a range of new online services have taken their place. The traditionally known as IT companies are now in the core field of retailing, transportations, logistics healthcare and so on. Uber car share, Uber foods, Airbnb, Apple Pay are some of the new companies that have crossed the boundaries of IT industry and landed in other industries.

The rapid technological advancement has 87% business executive believe that digital transformation is imperative (Gartner, 2018). With increased competition, businesses are being compelled to adopt digital trends, prefer digital marketing over traditional marketing, and rethink their business models while others are exploring ways to leverage technology to minimize operational costs (Gartner, 2018). The industries are trying to find new ways to create competitive advantages, increases efficiencies to reach customers at the lowest possible costs. For instance, banks are striving to reduce operation cost by a partner with FinTech who provide technology to essentially provide same services as it is provided at a branch, with the only difference is these services are readily available.

FinTech - short for Financial technology, means technology and innovation that aims to compete with traditional financial methods in the delivery of financial services. The Newly arising FinTech industry needs to understand the target audience and design products accordingly. The banks are already using a range of digital marketing tools to analyze customers' needs patterns, so as to come up with attractive products that may drive up the usage of the business. Likewise, Banks need to explore ways to mitigate the risk of future by analyzing historical data and predict the hindrance of the future. Apart from the vital changes in behavior amongst millennial, it is significant to note that a vast majority of millennial have experienced recession of 2009 in the U.S, the impression of which has consequently turned millennial into cautious investors or in other words risk-averse; However, this risk averseness may vary amongst millennial across the globe (Sloan, 2018). In addition to Banking sector's focus on digitalization of their process, and attempt to move away from paperwork, the banks are largely focusing on a branchless aspect of banking; also known as 'FinTech' industry thus realizing the future revenue streams in light of behavioral shift of the masses (Kendall, 2017).

LITERATURE REVIEW

Theory of Disruptive Innovation

The theory of disruptive innovation may help explain the race for digital technology adoption. While we are not oblivious to Bank's propensity to sell banking product every time it interacts with customers as figured by SVP of Cement's banking practice (Wisniewski, M. 2016), Clayton M. Christensen explains theory of disruptive innovation in the Innovator's dilemma (1997) which states that smaller companies with fewer resources can dethrone companies with substantial resources, better positioning and market share (Hutt, 2016).

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Disruptive Innovation refers to innovation and technology whose application significantly affects the way a market or industry functions thus leading to either creation of a new market or new industry & value network and eventually disrupts the structure and makeup of an existing industry, market and value network. According to disruptive innovation theory, the big market players often focus on improving existing products, while new entrants focus on ‘Foothold’ market wherein customers are happy despite poor services (Raynor, M. E. 2011). Christensen observed that new entrants who merely replicated the existing model failed while the one wherein the existing model was tailored to serve underserved or less attractive market succeeded (Raynor, M. E. 2011). The theory of disruptive technology has been vastly misunderstood. It has been unusually linked with Uber’s phenomenal success of its operations that continue to expand till date. However, Uber’s success was by no means a disruption. For a company to be categorized as disruption, it has to comply with two tenets of disruption, with it being organization either serving low-end footholds or new market footholds (Clayton M. Christensen, 2015).

With digitalisation taking the world by storm, it is imperative to understand how industries are being shaped by rapid technological developments from a wider perspective. In the light of ever-increasing incorporation of digital technologies like artificial Intelligence, machine learning, & data analytics, a clear pattern of investors’ interest has emerged in business that shed light on their digital initiatives (Suraj Srinivasan, 2019). From self-driving cars of Tesla to artificial Intelligence predicting inventory stocking, all these technologies, if used in the right way, could have a significant impact on financial indicators. This explains banks’ thirst to adopt technology and focus on underserved or unbanked population (new market foothold) by means of using digital wallet accounts to create a market where it didn’t exist before. Banks are rapidly adopting technology, partnering with FinTech and subsequently increase their outreach. For a bank to ensure that it is causing disruption, it may have to do the opposite of what Uber has done by serving an existing market in San Francisco where people were already acclimatized to booking rides.

Further, in this chapter, you will find the digitalisation aspect to better understand the constituents that are enabling the banking industry to cause disruption and adopt digital transformation to aid the same.

Digital Disruption and Marketing Return on Investment (MROI)

Digital disruption is a change that occurs when new emerging digital technologies and business models affect the value proposition of existing goods and services. Such disruption are technology driven and give rise to new business models. It appears easier to understand how companies like Uber, Amazon, Google, Apple, and Lyft, etc. are disrupting industries, but it is not easy to recognise when disruptive technology appears on the horizon. The disruptive technologies create competitive advantages and first movers advantages. However, it is important to continually ‘engage with any disruptive technologies as this will make a difference between survival or growth. Innovators not only have to innovate but also disrupt an organisation and industry, as they use innovation as a tool of normal competitive advantages and thus changing the organizational dynamics, strategic planning, investment priorities and the future technologies (Hill, 2017). The digital technologies can create core competencies as such technologies are virtual, embedded in the organisational systems, or appear from the outside normal horizon of organizational vision, however they add value to the stakeholders, can be rare, non-imitable, non-substitutable and widely applicable in a range of fields (VRIO). Previously many technology disruptions had been generally triggered by physical technologies such as PCs or ATMs, but now with some exceptions (robotics) the most digital disruptions are initiated in the virtual world, which makes them difficult to recognize, or imitate or understand (Hill, 2017). In the past, companies such as Facebook, Netflix,

Alphabet/Google, Amazon web service and Uber, etc. have used *BuTeInSo* model of disruption. Where *Bu* – means, Business (Market, Development, Pricing, Delivery, et); *Te* -Technology (invention, design, usage, etc.), *In*-Industry (processes, standards, methods, customers, etc.) and *So*- Society (change culture, habits, movements, etc.) (Hill, 2017).

In the present age, digitalization & digital transformation is amongst the most overused words, pretty much like strategy. One would often find executives using them in their day to day life without realizing its essence. This implies mere adoption of technology does not ensure businesses' success, rather the right use of technology by examining the disguised opportunities and translating into an action plan (Furr & Shipilov, 2019).

Businesses all across the world are implementing technology throughout its entire value chain; likewise, this has allowed banks to tweak their services to facilitate their customers. Since businesses are heavily reliant on customer data, almost all digital campaigns of products by banks are designed after developing an understanding of Consumer data, this is where marketing and finance are working together to create a meaningful return on investment -MROI on marketing efforts- a way of measuring the return on investment from the amount a company spends on marketing (Nichols, 2014).

It is needless to say that swift digital changes are causing change management issues amongst the organizations as some opt to make amends into business' value proposition by drastically changing it to cater new demands of the customers while the others prefer sticking with the existing value proposition, though opt to use the digital tools effectively (Furr & Shipilov, 2019). Kotter's theory of change management underlines that for change to occur, organizations have to understand its significance (Pirainen, 2016). Realizing the same, the companies are on varying stages of change management in their pursuit for digital adopting, while some are busy in creating a sense of urgency for digital implementation, others have institutionalized the change.

For instance, Maersk, a shipping container company which belongs to an industry that plagued by varying global trade barriers and lack of transparency. Maersk, however, partnered with governmental institutions and IBM to implement blockchain technology, allowing it to receive real-time data from sensors to lower administrative expenses, considerably improve risk assessment, which eventually is enabling it to serve the customer the right way (Furr & Shipilov, 2019).

In the past, unavailability of data posed a huge obstacle to marketing efforts for the bank to justify in front of stakeholders. For instance, in 2010 Intel began to work on the link between marketing and P&L. David Ginsberg who worked as VP insights. Brand and strategy at Intel realized the significance of analytics and bridged the gap between finance and marketing by highlighting the impact of the latter on sales (Nichols, 2014). This has led to financial accountability of marketing to come into prominence in addition to the availability of a platform with which testing of different scenarios may be checked and feedback that could be incorporated into performance strategies. To achieve successful implementation of distal disruptive technologies, not only requires leadership and change management, but it also requires an understanding of customers, their needs, and their reasons of adoption or not adoptions of technological innovations.

Innovation Operational Model For Banks

For a bank to meet its business needs, it has three innovation operational model at its disposal: Centralized, decentralized & hybrid.

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The centralized model is characterized by the presence of an innovation officer who scrutinizes with its innovation team to cater to business needs. The model banks on the need for innovation and consistently paves way for the bank to embrace new ideas and concept (EY, 2017). The Centralized model ensures better coordination amongst the departments, specifically with chief technology officer, etc. Despite the positives, the flip side is the team's lack of understanding for different business units. It is substantial to note that FinTech's may benefit from the support extended by centralized innovation model given it is successful. On the contrary, the business decision cycle may be thought about at length.

The decentralized model works well for small banks with each business unit running with tailored made governance processes, working favorably in favor of identifying problem and solutions. Like the rest of the operational innovation model, it has a flip side as the process may be plagued with the repetition of a task performed, varying processes and inconsistency. FinTech's may not have qualms working with organizations working along the lines of decentralized model since FinTech culture is characterized by quick decision making, drastic changes and rapid deployment of newer technology.

In the light of the pros and cons mentioned of Centralized and decentralized model, the suggested model is hybrid according to EY's research (EY, 2017). The need to have distinct innovation team that not only sets the right direction but leadership that backs and reinforces the benefit of innovation. The hybrid approach focuses on lessening the distance between innovator and business units but the transparency while the acquisition of technology on both sides is of utmost importance so as to avoid the FinTech from getting confused.

GLOBAL INCLINATION TOWARDS FINTECH ADOPTION

As per theories of consumer behavior, many external and internal factors determine the adoption or use of a product or services. The researchers have used theories of reasoned actions, theories of planned behavior, theories of diffusion of innovations, etc. have been used to develop technology adoption model (TAM). In summary, those models have evidenced that user-related personal factors (demography, need, utility, ease of use, self-efficacy, comparative advantages and external factors (technology related, trends in mobile usage, social-cultural and environmental factors) determine the success of adoption of technology (Venkatesh, Thong, & Xu, 2012 and Lai, 2017).

FinTech is deemed as the next big thing which is luring market players from different industries to explore the prospects of tapping into FinTech. A detailed survey conducted by EY of developing & mature markets has identified a pattern in terms of feature usage offered by the FinTech (EY, 2017). The report extensively highlights the initial market traction the FinTechs have been able to garner in developing and mature markets by extending primary features of money transfer. The incentive in developing market is to capture the unbanked population that does not have access to banking facilities.

The theory of financial innovation by Siber (1983) may explain the phenomenal inclination of firms to enhance financial inclusion efforts and may be defined as the expansion of money benefit is central to financial inclusion (Michelle, 2016).

For an instant in Pakistan, the mobile phone ownership in Pakistan amongst people in the age group of 15-65 is 57% (Rizvi, 2018). Despite the fact that smartphone ownership stands relatively lower at 22 owing to less usage of internet and the much-delayed entry of 4g technology in Pakistan's market that has seen gradual interest of masses towards the internet, (Shahid, 2017), yet the future seems promising since many banks in Pakistan alone are focusing on partnering with FinTechs and working to bank the

unbanked by extending almost the same services as what conventional banking has to offer. Likewise, in India where the electronic market size is rapidly growing at 41% and is poised to reach US \$400 billion (IBEF, 2019), Paytm FinTech is growing by leap and bounds as it has reported a financial profit of \$2.7 million (Anand, 2019).. Given the phenomenal response, the organization is contemplating to introduce further products and increase transaction on this platform (Anand, 2019). EY's report also indicates the highest adoption rate to be in China and India at 69% and 52% respectively while average adopting in the emerging market is at 46% (EY, 2017).

The next section discusses a range of external and internal drives for the adoption of FinTech.

Social Media and Technology Adoption in the Banking sector

The FinTech has gained tremendous popularity over the years, not because it is merely a trend that has matched people's lifestyle but the lucrative opportunity for businesses to expand, capitalize on ease of doing business that comes along with it, for customers and businesses alike. The app-based banking solutions makes everything tap away, accessible wherever and whenever. In present times, the banks are competing with each other to capture market share in the digital sphere; however, the platform based organizations with the accurate know-how of local dynamics have potential to bring an element of surprise in the competition.

For example, Kaobank as a digital-first bank; launched in 2017 and successfully amassed over 300,000 subscribers in the first 24 hours of its operations, which now is poised to have over 10 million customers in South Korea with a population of over 50 million (EY). The idea of Kakaobank was conceptualized by Kakao Talk, a popular messaging platform which identified that underutilization of banking products since the products itself was not customer-centric. Understanding the gap, the Kakaobank began to dig deeper. The research conducted in collaboration with EY concluded that the decision of switching banking service provider majorly hinges on price; therefore, pricing was a priority to better cater to banking demand of the South Korean.

This is another classical case of local know-how which has been discussed extensively. With a major chunk of traditional bank's cost being attributed to running its operation, Kakao bank preferred a business model without physical branches, effectively slashing all costs so as to focus on offering banking products at a better price.

The Kakao Banking app does more than what typically FinTech apps have to offer. Besides providing option to instantly pay bills, transfer money and market place, it is offering option to get personal loans based on individual's need, transfer of money internationally at a reasonable interest, which has garnered interest of emerging technology companies to expand their horizons and unearth ways to diversify portfolio, thereby challenging the banking sphere into reassessing their value proposition (EY).

The Spread of Mobile Phones, Youth Market and FinTech Adoption

With mobile phones becoming alarmingly common amongst the youth, one big reason for it being popular is the availability of social media applications on it. According to research, mobile phones are unimpressively popular amongst the youth in India (Vaidya, 2016), a country with the second-highest population. The addiction is a worldwide problem as in the U.K where the average age of children owning a mobile phone is 7 (Forster, 2017). Resultantly, it is leading to growing concerns in the U.K where parents are forced into sending their kids for Smartphone rehab over unfavorably high screen time and

declining interest in other activities. However, in the U.S, children as young as 13 are undergoing treatment for digital technology addiction (Tsukayama, 2016).

The theory of self-presentation may explain the rising popularity of mobile phones amongst the youth, with theory stating people may share personal information that they may deem consistent with their perception which they wish to disclose to others (Goffman, 1959, Schau & Gilly, 2003). Although all these may indicate to a growing problem for parents and society in general, this may well work in favor of FinTech as 48% of FinTech users are in the age bracket of 25-34 (EY, 2017). With unprecedented number of mobile phone users being kids today, in a decade or so, the FinTech may have a huge influx of users for whom the tech giants may have to tailor product offerings in line with their lifestyle, with social media to spearhead in not only collection vital information to decide digital marketing ad run time but using it as a medium for viral marketing campaigns (Kaplan & Haenlein, 2011b)

The FinTech adoption will surge within the coming years, especially in the emerging market where people lack access to banking. A product offering that allows borrowing without having to go to the bank along with a feature to help in financial planning will certainly see a rise in the coming years. According to a report, Money transfer and payments will continue to dominate, something already highlighted earlier, with % of people engaging with tech applications for this purpose will stand at 50% (EY, 2017).

Collaborative Models of FinTech & Banks Driving FinTech

With FinTech widely predicted to dominate the banking industry in the near future, the perception leading to big money being splurged by investors who are under the impression that reward for investment at this instance will be fourfold. According to an estimate, the FinTech industry has seen a staggering US \$13.1 Billion VC back investment only in 2016 (EY, 2017). Considering the propensity of the digital sphere to evolve, the need for collaboration between FinTech and Banks becomes more and more evident.

According to the EY FinTech Adoption Index, consumers are more likely to uptake financial services offered by an innovative organization (EY, 2017). This also reflects that availability of latest technology may not cause disruption, rather the manner in which the technology is leveraged to capitalize in a given scenario. Likewise, With FinTechs' incessant reliance on customer data, increasing privacy concern coupled with regulatory requirement underscores the need for collaboration as customer acquisition and subsequent earning trust, building a reputation while striving to keep the customer experience at highest level poses a daunting task. In the light of this argument, FinTech is better suited complementing the traditional banks; however, the arduous procurement policy serves as the challenge besides implementing latest technology that is to run in parallel with bank's technology of the 1970s

The collaboration between FinTech & Banks will be a Win-Win scenario for both. For Banks, it will provide an opportunity to bring down the cost, and bolster profits while for FinTech, the customer acquisition, which apparently is by far the biggest hindrance, will be seamless which in turn will bring down operational costs, relatively easier to work in conformity with regulatory requirement and eloquently serve the customers. In Pakistan, the banks and FinTech appear to be following the strategy quite meticulously. While all Major Banks in Pakistan are focused on enabling customers to benefit from digital bank's application, the microfinance and commercial banking are striving to bring the digital wallet to customers, which enables customers to essentially sign up despite not having a bank account. Banks like FINCA, HBL, Telenor – A telecommunication organization with a Microfinance bank are all lured into this industry by the future potential. It is imperative that each bank has its own technology partners, overseeing the FinTech's operations.

FINCA has collaborated with Karandaaz whereby they will be rolling out digital financial services to reach low-income women who are involved in the cotton industry or industry work with an aim to expand financial inclusion in Pakistan (Karandaaz, 2018). This will not only enable them to have access to the contemporary digital wallet but will be extending nano loans by means of appointing community leader who will have access to loan no more than \$ 100. The feedback from the year-long partnership has been phenomenal as the loan is extended by a community leader who identifies the low-risk borrower.

Furthermore, the community leader markets SimSim application, who not only assist people in signing up on the application but trains as to how an app could be used to take control of their digital financial requirement. Given the project becomes successful in Pakistan, it would reshape the digital sphere for the poor women in Pakistan. With digital wallets poised to connect 1.6 bn (Arnold, 2016), of which more than half will be women, this project will enable women to contribute to the country's GDP.

Digital Product Substitutions as a Driving Factor

Digitalization is paving the way for FinTech to develop products that in future may successfully serve as a substitute for bank-branch based products. A digital product is an intangible and virtual asset or piece of media or a technological application or process automation and web-based services which can be sold and distributed repeatedly online without the need to replenish inventory. Banks are undergoing major changes themselves, and are adopting technology to improve value chain, and despite the lurking danger of digitalizing transgressing into boundaries of what conventional banking offers, the case of physical branch stands a strong case in the light of online scams, theft of credit information and phishing pages. It is superfluous to state that physical branches play a crucial role in ensuring that trust & credibility between customer and Bank are maintained (Frédéric Jacques, 2017). In a developing country like Pakistan where digital sphere has not built reputation, the presence of a physical branch hinges on success of the business, at least there is one such bank, U Microfinance Bank, who appear to be following this strategy as it recently inaugurated 170th branch after being injected with over Rs. 4 Billion to accelerate its growth (PTCL Pakistan, 2018).

In addition to providing convenience to customers to do a wide array of things in a branch, it is estimated that the network of branches in any given country is equivalent to millions of dollars to annual marketing. Despite the evident advantages, the global recession has dragged banks in a dilemma wherein it has become fundamentally vital to prioritize what bank's strategy is, whether it wishes to skew towards having physical branches and cater to preferences of customers or implement cost-cutting by relying on a digital medium (Frédéric Jacques, 2017). McKinsey's latest survey outlines the challenges faced by banks in addressing the varying expectations of the customers. While 56% of customers in the U.S expressed their inclination in buying a product through digital means, another survey shows that 13% have actually bought a product digitally, which goes to show that much like the rest of the world, the physical presence of bank's branches are vital to maintaining customer base and subsequently catering them (Frédéric Jacques, 2017). In the U.S where purchase power to opt for high-end gadgets is high, the actual % of people buying banking products digitally represents the acceptance amongst the audience. On the other hand, in developing countries such as Pakistan where 33% of people have not heard of the word ATM (Gallup Pakistan, 2016), the need for having physical branches becomes top priority, especially in Microfinance Industry which is seeking to bank the unbanked by rolling out numerous schemes, with majority of them targeting SMEs and farmers by taking into consideration numerous factors. Another

figure that makes the case of physical branch strong is people's inclination to trust a bank when it comes to making a financial decision irrespective of the bank one associated with (Gallup Pakistan, 2016).

Investors' Inclination Towards Digital Initiatives and Adoption of FinTech

The investors' confidence in digital technologies is a significant driver for the growth of FinTech. According to a publication by Harvard business school which analyzed the financial indicators of non-listed companies, it was found that non-digital companies are rapidly working to get into the digital sphere, with over 22% non-listed digital companies reportedly going digital in 2017 (Wilbur Chen, 2019). Other stats indicate that firms going digital tend to have their valuation 7% to 21% higher than their peers (Suraj Srinivasan, 2019). Korn Ferry, an executive search management company that had introduced talent-related analytics in 2014 saw its valuation increase by over 60% (Wilbur Chen, 2019). In the same manner, a leading manufacturer of construction equipment, Caterpillar, invested substantially in analytics, which translated a 25% increase in its price to earnings ratio. The opportunities and threats offered by disruptive technologies are keeping the organisation on their toes. And adoption and adaptation to disruptive technology are becoming one of the main goals of the firms. The new innovations often create disruptions, so it will be significant to study the process and factors related to the adoption of disruptive innovations.

New Players And Services Are Driving Adoption

As highlighted earlier, the future potential to earn big from this arena is translating in big players from different industries flocking to get their fair share from profitability. However, not everyone succeeds in devising a business model and the right strategy. In some cases, existing big player consolidate themselves to an extent where it simply precludes other players from being profitable like Paytm that is leading the market in India (Anand, 2019). Therefore, FinTechs are increasingly exploring additional products that may enable customers to differentiate on the basis of superior and diverse yet exciting product offerings. According to an estimate (EY, 2017), 50% of customers are using digital wallets for money transfer and payments. This is quite true in case of FinTechs in Pakistan who base their campaigns on utility bills payment and offer cashback in a bid to increase the transaction by the wallet account users. In present times, the cashback offers serve as a big incentive for consumers who flock to FinTechs with competitive promotions besides product offerings. (Mavadiya, Forbes, 25).

A Case of Apple's Jump From Apple Pay to Credit Card

A common scenario with FinTech new entrant akin to that of Apple credit card is that they shoot to stardom initially only to struggle to perform in line with the expectations set earlier during the planning phase. **Apple Pay** is a mobile payments service and digital wallet app that utilizes Near Field Communication (NFC) to initiate secure payment transactions between contactless payment terminals and Apple iOS devices,

Apple, one of the leading big tech organization that designs, develops and sells consumer goods, with a huge market share in developed markets has unveiled its new product which makes it a banking player. Previously, Apple had unveiled 'Apple Pay' back in 2015 when it began serving as a substitute for bank's debit and credit card, reliving customers hassle of carrying a physical card, and likely protecting

it from losing or misplacing it (Kelion, 2015). The introduction of pay saw industry-wide interest in the U.K with all major credit card and banks signing up to support new service.

In Apple's case, since the service has been launched only in America, it has received mixed feedback from Wallstreet investors (Fuscaldo, 2019). The Apple policy of cashback is under scrutiny. The 2% cashback digital marketing campaigns may be good enough but given the credit cards are on decline and 1% majority of the transaction to come in the realm of 1% cashback, the cashback may be merely viewed as acceptable (Fuscaldo, 2019). Moreover, the card is expected to generate \$882 million which is not on part with what analyst had predicted so far. With Apple Pay flaunting product with unbelievable cashback, lowest interest rate, and free credit card, there are other FinTech who are more or less offering the same rewards. For instance, petal- a Network based FinTech that recently secured funding of \$30 million, offer rewards that are quite similar to that of Apple's (Fuscaldo, 2019). With rewards being a differentiating factor for choosing credit card services, banks and FinTech alike have stepped up the reward scheme to preclude customer base from being lured away to the competitor.

Fast forward to 2019, Apple has taken another big stride which brings it heads on the competition with leading tech. The resultant success of Apple Pay now has paved way for launch for Apple card which makes it a banking player, with potential to wipe out competition in FinTech arena (Mavadiya, What Apple's Credit Card Means For FinTech, 2019). Behind Apple's latest venture into the banking, the arena is its partnership with Mastercard and Goldman Sachs with the value proposition of it providing 'Healthier financial life' (Mavadiya, What Apple's Credit Card Means For FinTech, 2019). With strategy to pursue customer and behavioral shift into using Apple's credit card and accordingly designing content marketing to given snapshot of products usage, it is also relying on its instant cashback of 2% on all transactions or 3% given it is spent on Apple products (Dans, 2019), something that many FinTech is working on with prominent example of Jazzcash & SimSim in Pakistan whereas Paytm in India. The cashback scheme captures the millennial trend meticulously by offering instant cashback and serves as viral marketing content for the organization. While Apple card's performance may not reflect as a threat for the credit card industry, it may set a precedent for other players from the smartphone industry to get their fair share of the industry's profitability. It is to be noted that in addition to Apple Pay, Samsung has its own version of digital payment 'Samsung pay' (Savvides, 2019). The Samsung pay works along the lines of Apply pay model, except the only threat Apple card may face is the staggering market share that Samsung has. According to the IDC report, Samsung leads the market with a share of 23% while Apple's share is almost less by half of Samsung's (IDC, 2019).

Apple's card is distinctive in a sense that unlike traditional credit cards issued by banks which involves extensive formalities, the Apple credit card is readily available to use. The Apple wallet requires few minutes for registration and its credit is at the user's disposal for use, a concept that is in its initial phase (Dans, 2019). In simpler words, it is a reinvention of credit card that comes with extra security, essentially preventing fraud. This is quintessentially a product that poses threat to emerging and existing FinTech as a market leader from another domain has successfully found a market which it is catering to rather differently and the very transaction is done Apple users at any given place is equivalent to the marketing of the product. Another benefit for the consumer from the Apple's credit card is that although it doesn't come with a CVV code or any number, losing it means that a user may immediately block that card and subsequently apply for a new one. The user may have to rely on card rarely since the smartphone payment is widely accepted, in 70% of establishments in the U.S (Dans, 2019). Another interesting policy linked to the card is the decline in interest, the more customer pays off the amount it owes, meaning thereby that it encourages paying less interest and above all else upholding privacy concerns of its customers.

Digital Banking & Financial Inclusion Driving FinTech

Digital banking means either online or mobile or virtual banking or digitization of all the traditional banking activities, products, process services and programs that historically were only available to customers when physically inside of a bank branch. Without an iota of doubt, digital banking is the future for increasing financial inclusion. The average mobile usage amongst the youth coupled with the pace with which mobile manufacturer is increasing their outreach, it is evident that banking is being shaped gradually. However, tough questions to ask at this juncture are how digitalization would ensure that a poor household, with no access to banks, could benefit from the services it offers.

Financial inclusion means that individuals and businesses have access to useful and affordable financial products and services that meet their needs. financial inclusion means a process of ensuring that individuals (everyone, in particular, vulnerable people) or weaker section of society) and businesses have an easy, affordable and transparent access to useful and affordable financial products and services that meet their needs. With the spotlight being on FinTech, it is imperative to establish the difference between financial inclusion and financial data inclusion to better understand the scope it has the potential to serve. By virtue, financial inclusion is a strategy adopted by FinTech to reduce poverty by bridging the gap between unbanked and availability of finance. Though it is a separate discussion of the extent to which lower class may benefit from the service, but it is not the sole strategy to alleviate poverty. The government may partner with Philanthropist and charity organization to deal with pressing issues like poverty, availability of education and healthcare. Financial inclusion ensures the availability of financial services to unbaked, in other words, to all segments of the society whereby one is empowered to make sound decisions. As opposed to financial inclusion, Financial data inclusion is merging the entire population's biometric information to their bank account (Ozili, 2018). The merger and the resultant financial data inclusion may result in numerous benefits. It allows verification of digital transaction and may help in tracing transaction to the individual. Further insights may also be extracted on the basis of demographic. Participation of the general public in financial data inclusion may prompt greater financial inclusion as more individuals will have bank accounts log in linked with digital wallets that will allow masses to avail financial services. However, if the unbanked population refuses to participate, they will not only miss out using digital channels to carry out financial services but will perversely impact the financial inclusion indicators.

To examine the benefits of financial inclusion, it is imperative to understand the essence of digital financial inclusion which is defined as access to digital and usage of the same by underserved or excluded population (Timothly Lyman, 2015). With digital wallet services launched in over 80 countries (Clarie Penicaud, 2019), it is allowing poor customers to have access to financial services. These services cater poor in a sense that it empowers them, brings them in the center of decision making with respect to their finances, with the availability of financial services at a lower cost. The very financial inclusion assists in making sound decisions, allowing them to save for the future and possibly make the investment to increase their wealth. Given that banks are adopting technology and partnering with FinTechs to capture the market, the move to FinTech apps not only translates into favorable financial inclusion for the masses but also reduces stress on the banks (Rui Han, 2013) in terms of deposits. The more financial inclusion getters bigger in a country, it will see series of small savers whose accumulation of savings would reduce procyclicality risk, in other words, significantly reducing bank's dependence on non-core financing (Khan, 2011). The notion of forcing to get things done is existent in present days. Financial inclusion by force is expected to yield considerable benefits in the future, which is prompting govern-

ments to explore ways to impose measures that will ensure financial inclusion. It is to be noted that the more digital adoption is done voluntary, the better it is for financial inclusion as otherwise, it will merely impact financial data inclusion which is different from financial inclusion in its entirety.

One practice in Pakistan's bank links financial inclusion by force. FINCA Microfinance Bank, a subsidiary of FINCA International tends to transfer money of its employees in SimSim, a FinTech digital wallet, developed in collaboration with Finja, a technology partner for FINCA in Pakistan. In a market that has already seen banks introducing digital wallets to bank the unbanked and race to capture user base with active accounts, the idea of forcing employees may yield benefit in a way that they would be accustomed to it and what better than word of mouth about SimSim's Money transfer, IBFT, bill payment being spread by its own employees.

There are two strategies that FinTech and banks may opt for customer acquisition, one may be through relationship managers present in physical branches that will not only aid in establishing brand awareness but also credibility that comes along with it. The other strategy is customer acquisition through social media which for companies may account for 20% of their marketing budget (Christine Moorman, 2018) and reach the audience in far-flung areas with access to social media and bring them in the banking net through an easy and convenient app. Assuming that customer is acquired, the digital marketing's paid campaign may be availed to continually reinforce brand awareness, leverage it to get customer feedback and timely cope with product queries and issues (Christine Moorman, 2018).

Financial inclusion is inherently beneficial for the economy. Given banks put emphasis on catering lower end individuals, it may be immune to macro-economic shocks, which may, in turn, enhance the economy due to the level of high deposit, and may prevent financial crises (Hanning, 2011). Generally, it is assumed that the vast majority of people, the unbanked, have access to mobile phones. However, in order for financial inclusion to become a reality in emerging markets, the prerequisite is to have affordable internet connectivity.

CRITICISM OF FINTECH AND DIGITAL MARKETING

While digital finance is a hot topic in the current business era, it has received its fair share of criticism. The view of the World bank encompasses the belief that higher use of digital finance may lead to high financial inclusion. However, the researchers suggest that instead of leading to higher financial inclusion, it rather leads to higher financial data inclusion (Accelerating financial inclusion in south-east Asia with digital finance, 2016).

According to a report by ITU, the usage of digital wallet may face impediments so as to create acceptance amongst vendors to set up a digital payment method (ITU, 2016) in emerging countries where setting up digital payment method is costly. As a result, the poor despite having access to digital wallet may not be able to carry out the transaction. The fact that poor individual may have a digital wallet set up indicates financial data inclusion, but as discussed earlier, higher financial data inclusion does not contribute to financial inclusion.

Aside from this, digital finance may not realize its full potential owing to concerns of digital marketing reliance on personal data. This scenario is generally more applicable on first world countries where data protection is of utmost importance, so much that companies inevitably have to hire data protection officers (Burt, 2019). While top companies like Facebook have been fined approx. \$ 5 Billion for data breach and failure to comply with local laws (SHERR, 2019). In many countries where FinTechs are

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operating, the regulation relating to this are being developed following observing the implications that a FinTech service may have on the masses.

The digital sphere is evolving at an ever-increasing pace. The evolution is not juttred paving way of connectivity, access to finance and data to make an informed decision, it is also providing additional opportunities to hackers to attack computers, and potentially endanger customer's data. This is causing regulatory bodies to devise newer regulations to preclude any unforeseen incident from happening. An example cited earlier is of Facebook who failed to comply with regulatory bodies, resulting in a fine of \$ 5 billion (SHERR, 2019). Moreover, with the enforcement of new regulations like having to hire data protection officer, the cost of protecting data for FinTech becomes more expensive than offering financial services, fundamentally putting regulators at odds with the FinTech firms.

In emerging countries, the regulations are not as stringent as in developed markets which coupled with people's perception of data being prone to hack, serves as a hindrance.

Digitalization and Loss of Jobs as Arguments

In certain segments of society, the digitalization has been perceived negatively, looked down upon as it may lead to the impending loss of jobs. However, the fact that physical will be eliminated in its entirety is downright untrue as some part of physical may always exist (Furr & Shipilov, 2019). According to World economic form's report on 'The Future of Jobs', the adoption of new technology does not necessarily result in redundancies, rather it results in augmentation of jobs, creation of new jobs, drives business growth (World Economic Forum, 2018). The report states that 50% of companies foresee automation causing a reduction in workforce by 2022 that may also give rise to new jobs which may be performed by skilled contractors whom companies may have to deal in a far more flexible manner (World Economic Forum, 2018). 71% of total hours of work tasks are performed by humans in 2018 but this number is will dip by 2022, with 62% of data processing and similar tasks will be performed by machines (World Economic Forum, 2018). It is imperative to note that decline in some jobs may be offset by emerging jobs that will outweigh the number of jobs lost, roles that leverage human skills such as OD specialists, Culture professionals, Data analysts and software developers.

Furthermore, according to the World economic forum's report, a new job role of digital marketing has emerged (World Economic Forum, 2018). This is evident due to the constant evolving digital economy that has challenged the fundamentals of traditional economics and created a need for marketing on the digital medium. The emphasis on digital marketing's importance may be understood by numerous re-searches that reinforces the need to adopt digital marketing arena by incorporating marketing curriculum to cater to the requirement for digital initiatives (Wymbs, 2011).

WAY FORWARD FOR FINANCIAL INDUSTRY AND SCOPE FOR FURTHER RESEARCH

Amidst the commotion to capture market share, digitalization and race to secure highest wallet transaction, the financial industry has to be meticulous at this juncture in adopting the digital technology and diligently use marketing campaigns to convey precise information. In the lights of factual arguments presented earlier, it would be in favor of the industry to adopt the financial revolution as overlooking may not only drive them out of the competition but will too much on the marketing front. According to

Mckinsey, there will be a decline of 20- 60% of profits in the banking industry worldwide (Mckinsey, 2015). Moreover, the investors may have to change their expectation of the pace on which dividend is earned on the investment. The current system is based on a mechanism that intensely focuses on short term reward, which essentially inhibits the FinTech from realizing their full potential (Shaikh, 2017). A long term view is the only solution for FinTech and banks to collaborate and bank the unbanked. An example of what FINCA is doing in Pakistan.

Likewise, it is imperative for the financial industry to differentiate technology from innovation, for financial technology itself is a commodity. With the internet being bombarded with software, it is quite easy for anyone to acquire software, the real deal, however, remains the execution of the strategy to bring an industry-wide change. Banks will also have to take into consideration the hassle women entrepreneur have to encounter when looking for finances for their business. In order to have wider financial inclusion, the banks would have to cater to Women entrepreneur need by developing a product, much like what Karandaaz is working on for the upliftment of women. Moreover, banks will have to work on eliminating biases when considering financing inclusion applications. According to a research, women's access to capital with respect to another gender (Malin Malmstrom, 2018) and even if the loan application is approved, it comes tougher terms and conditions in comparison to males which indicated a clear case of gender bias in loan processing. It is advised for Banks, specifically FinTech to make financing decision centralized so as to prevent a female entrepreneur from being screened out which otherwise would put out of the formal economy.

In nutshell, the way forward for banks is collaboration as neither party alone could capture market, FinTech would be needing Banks to compliment and use its expertise in customer acquisition which is supposedly a tough ask while for banks who are working on near obsolete IT model, it needs FinTech to increase its outreach, allow it to move from conventional banking to branchless given the former deems it fit. Additional features in FinTech like availability of tailored made loan that are readily available based on one's risk assessment would go have the potential to gain sufficient traction.

The future research can focus on developing sensors or mechanism of innovations and recognizing the appearance of disruptive technology, the factors that lead to adoption or non-adoption of disruptive technologies. And how a company can create a culture for disruptive innovations and continues doing so! Research can also focus on to determine the boundaries of disruptive technologies and scopes of industry convergence etc. Also, future research can focus on FinTech as an economic tool of national development, etc.

CONCLUSION

In the present times wherein the digital finance, social media coupled with mobile usage amongst people in general and teens, in particular, is spiking high on yearly basis, it is suggested to thoroughly utilize social media to gain insight and base decision pertaining to digital paid campaigns. The digital marketing has opened a new avenue for banks to unearth hard facts about the banking products, and general perception associated with a particular brand, with tools like businesses pages to address customer queries. The business leaders should be smart enough to sense the appearance of disruptive innovations, visionary to view- digital acuity, bold enough to challenge status quo, creative enough to create a culture of innovation and insight to determine customers' point of view.

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Given the growing trend of digitalization and FinTech, digital marketing of present times requires to be data-driven to cater to the demand of contemporary businesses (Startsev, 2017). Prior to running any campaign for a product, it is more vital to ascertain the viability of the product and accordingly design campaigns on the basis on local know-how to make it work. For instance, Uber's introduction of cash payment feature enabled operate seamlessly and cater customers who have traditionally been comfortable with using cash (Uber, 2016).

While companies like Uber may succeed by introducing an additional payment option, it may as well underline an opportunity for digital finance to use digital marketing in its truest essence to capture the market gap. For instance, it is the established fact that banks and FinTechs cannot operate in silos, for it is next to impossible to operate and develop the expertise to comply with regulations of different industry and implement contemporary technology on system checks that are based on the technology of the 1990s. Furthermore, the development of innovative payment solutions like contactless payment and Apple's credit card serves as trendy marketing of the product that garners a thorough coverage from relevant industry reviewers.

Lastly, in banking context for digital marketing to succeed, it has to be increasingly data-driven as its paid campaign would be only meaningful as long as it reflects various KPIs like increase in impression to traffic onto the website and generation of business leads. This outcome for business may be further refined given its the digital marketing efforts are aligned with a global strategy to cater the unbanked, thereby could help in increasing user base who may, in turn, make financial decisions.

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Chapter 12

Digital Business Transformation in the Banking Sector

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ABSTRACT

Financial technology companies (fintechs) have gained tremendous importance in the last decade and particularly in the last four years. They have contributed with disruptive technological solutions and provided not only complementary but also substitute products to the traditional banking sector. New incumbents have been challenging banks already established and forced them to innovate in order to remain competitive. Indeed, banks have a heavy burden of slow processes, costly business models, and few innovative solutions. The authors collected 100 articles from Scopus related with the fintech and bank topics. This study adopted a hybrid design comprising a systematic qualitative review methods and narrative, supplemented by semantic network analysis. Based on the results of the systematic literature review, the authors explored the impacts that fintechs have had on traditional banking sector.

INTRODUCTION

New concepts of fintechs have appeared and became interesting due to the reputational challenge posed to traditional banking caused by the subprime crisis. Consumers have questioned the strategy of financial industry and the impacts it has had on the world economy (Dell’Atti, Trotta, Iannuzzi, & Demaria, 2017). Fintech companies have real impacts because their technological solutions are being broadly adopted in banking or retail being blockchain a case study even for cyber security (Kshetri, 2017). Fintechs impact the traditional banking system because they challenge the existent business model and provide much

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more technological solutions characterized by lower prices and higher accessibility. Fintech is a fast-growing sector with high potential and may be considered a disruption on the current state of technology. Consumers are adopting these services due to their advantages which constitute solutions for the future of banking and several other industries. Nonetheless, the risks associated with this new industry should also be considered. The current risks that fintech companies pose may affect consumers, companies and the entire financial stability (KPMG, 2019) because currently fintech offer a diverse range of services which can be a plain current account but also virtual investments in fiat or digital currencies (Brochado, 2018a). The examples are the Initial Coin Offerings (ICOs) which are an alternative investment form offering the possibility of direct financing from investors worldwide (Brochado, 2018b) and contributing to the democratization of entrepreneurship and access to capital markets (Chen, 2018).

The aim of this chapter is to study fintech developments and in particular the impacts they have had in shaping traditional banking business models recently challenged (Roland Berger, 2018). This paper aims at answering the following research question: What insights does current literature offer regarding the impact of fintechs in the banking sector?

The structure of this chapter is as follows: (i) next section offers a descriptive analysis of the impact of fintechs and digital solutions in banking; (ii) the methodology describes the approach used to collect the papers under analysis and the content analysis approach; (iii) the results section includes a descriptive, narrative and semantic analysis (iv) the chapter ends with conclusions and the avenues for future research.

THEORETICAL FRAMEWORK

The Fintech and the Traditional Banking

The concept of fintech is not consensual. Following the study of Schueffel (2016) fintechs are defined as “new financial industry that applies technology to improve financial activities” (p. 15). These new solutions gained hype after the European banks suffered several shocks which challenged their business model and have been affecting their profitability until today (Cheng & Mevis, 2018). This is confirmed by the historical prices of the Euro Stoxx for banks which still did not recover from values before the crisis. After the subprime crisis the strategies of central banks were to ease monetary policy reducing the interest rates and increasing the monetary base. This policy had not only consequences on credit expansion in order to create economic stimulus (Spyromitrosa & Tsintzos, 2019) but also on less opportunities for regular and even sophisticated investors because the interest rates on investments are much lower than before (e.g. regular savings, the LIBOR and EURIBOR are much lower which also impacts the availability of money and investments) (Kreidych, Roshchyna, & Kazak, 2018).

Traditional banking is characterized by a costly model of branches (Gomber, Kauffman, Parker, & Weber, 2018, p. 230), traditional lending, relationship deposits and traditional sources of revenue (e.g. interest rate charged and banking fees) (Chiorazzo, D’Apice, De Young, & Morelli, 2018). However, there are also drivers which support the appearance of fintech companies in an era of digital expansion with easy access to the internet. As per Gomber, Kauffman, Parker, & Weber (2018) and KPMG (2019), the main drivers of this technological revolution are: (i) *Technology innovation*: the pace of technological transformation is increasing very fast and technologies often interconnect with each other creating technological breakthroughs. As fintechs are based on IT structures, this technological improvement supports

these companies; (ii) *Process Disruption*: the appearance of virtual currencies based in a blockchain process created a process disruption, making it the new model that should be adopted. Gomber, Kauffman, Parker, & Weber (2018) argued that “the entire financial services industry has been disrupted in fundamental ways” (p. 225); (iii) *Services Transformation*: a transformation in the service provided by financial companies has been noticed due to consumers’ pressure and technological developments. The fintechs’ service has been putting pressure on traditional service transformation; (iv) *Economies of scale in IT applications*: according to Lacity & Willcocks (2001) an example of economies of scale in IT is the outsourcing of IT systems to service providers. A higher investment in IT systems also improves the productivity of a company (Woudstra, Berghout, Tan, Eekeren, & Dedene, 2017).

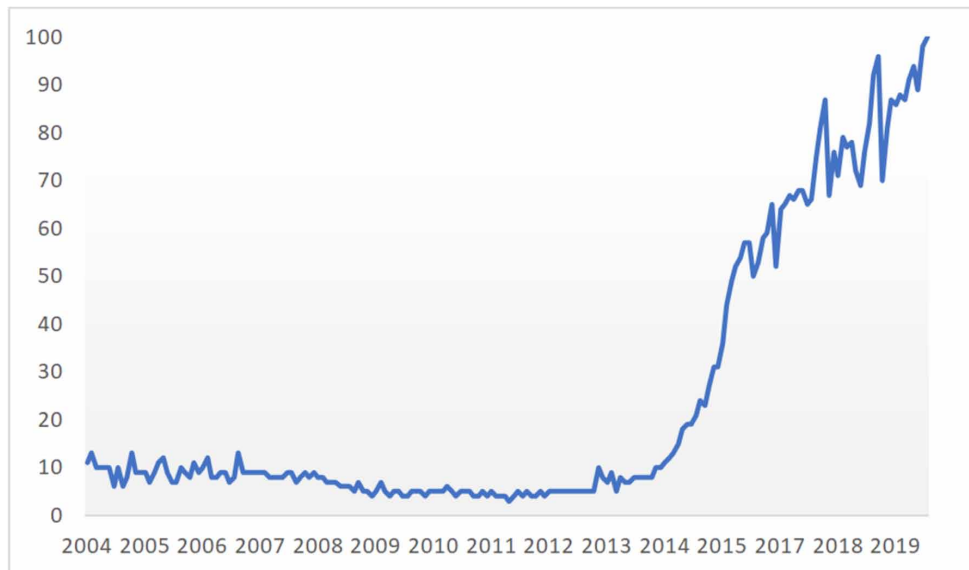
Fintechs pose a direct challenge to the traditional banks which need to adapt to new consumers’ trends from which fintech companies took advantage. Heavy traditional banking industry’s legacy might be a burden posing a threat to a fast and successful adaptation to the new reality (Gomber, Kauffman, Parker, & Weber, 2018; Chiorazzo, D’Apice, DeYoung, & Morelli, 2018). According to Roland Berger (2018) there are also social factors such as: (i) unwillingness to change from both employees and management; (ii) risk of unacceptance from shareholders; and business factors such as: (i) lack of cooperation between business functions and IT. However, the pressure on banks to change their business model is increasing not only on a business perspective (threat from new digital incumbents) but also from a social perspective because clients are demanding bigger Corporate Social Responsibility (CSR) from banks. As an attempt to answer consumers’ demands, banks are creating sustainable CSR policies (Costa-Climent & Martínez-Climent, 2018). Fintech companies were born in a context where CSR is demanded and they took advantage of this fact because a wide range of investments, such as ICOs, are on sustainable solutions and several fintech platforms allow investment in a broad range of “green” solutions. Complementary is the capacity of fintechs to finance Non-governmental Organizations (NGOs) and social causes worldwide due to their technology which captures the interest and investment of both companies searching for investing in social causes but also captures the interest of consumers (Freivogel, 2016). According to Roland Berger (2018) fintechs appear as the third driver of innovation in terms of relevance only after the “customer behavior” and “tech giants”. Traditional banks are trying to adapt to this new reality by transforming their processes and making them more digital while cooperating with fintechs or acquiring them in order to integrate their innovations. According to the same report the fintechs are considered: (i) industry innovators, (ii) platform drivers and (iii) solution providers but currently not a direct substitute of the traditional banks as long as they can keep up the innovation pace.

The Interest on Fintechs

The banking sector is still recovering from the last financial crisis but has today achieved a steady position due to a feeling of safety caused by the central banks’ measures. Although with several challenges such as poor growth, banks have achieved solid accomplishments revealed in market capitalization, tier 1 capital ratios or stable returns (McKinsey&Company, 2018). There are forces which drive innovation (e.g. technology expansion and permissive regulation) and promote the appearance of new market incumbents as the fintech companies that may affect banks profitability (Desai, V, V, & Jayakumar, 2019). Therefore, banks have been adapting and the ones digitalizing faster are the ones that are more prone to obtain bigger efficiency gains and thus stay competitive in the market (McKinsey&Company, 2018).

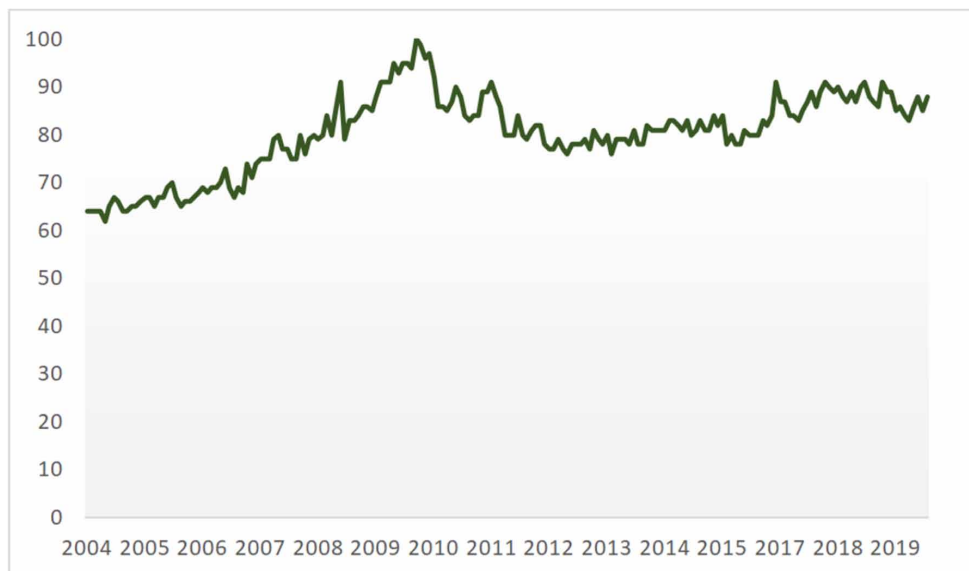
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Figure 1. Worldwide interest in the topic “Fintech”



Source: Google Trends (<https://www.google.com/trends>). The numbers represent the popularity of the term selected in Google searches. The values range from 100 (most interesting) to 0 (no interest).

Figure 2. Worldwide interest in the topic “Bank”



Source: Google Trends (<https://www.google.com/trends>). The numbers represent the popularity of the term selected in Google searches. The values range from 100 (most interesting) to 0 (no interest).

The interest in the new concept of fintech has been increasing and has had a rapid growth in popularity since 2013 as confirmed by Google Trends' data. On October 2019 the interest in the word "fintech" has 100 points which means maximum interest while the word "bank" has about 85 points. The word "bank" has stable levels of interest along the time period between the years of 2004 and 2011 ranging from 65 to 85 points. The word was mostly searched between the years of 2008 and 2010 during the financial crisis and had an interest peak close to 100 points on 2009.

Risks Posed by Fintechs to Traditional Banking

Currently the new incumbents are a real threat to the well-established banking system due to the substitute products and services offered (Vives, 2017). PWC (2016) estimated that 28% of the banking and payment businesses as well as 22% of the insurance, asset management and wealth management systems are at risk by 2020 due to the new competition. The reason is fintechs are operating concurrently with traditional banking particularly in the payments area, financial intermediation and cryptocurrencies. Fintechs focus on customer centricity due to the services provided. As a result, the importance of this concept increases as well as the adoption of fintechs' strategies by traditional industries with 48% of financial companies adopting fintechs' strategies into their business model (PWC, 2019). The most likely technologies which drive change in traditional business model of financial services organizations are artificial intelligence, big data, cloud and blockchain, all of them at the core of fintechs' business model (PWC, 2019). The pillars for a strong fintech ecosystem are a sustained demand for their services from consumers, companies and financial institutions, the access to talent which currently is more global, an enabling environment based on strong collaboration among incumbents, access to local and international markets and forces to a sustainable development as well as a favorable regulation (EY, 2018). The majority of these conditions are met today which urges the adaptation of traditional banking (Deloitte, 2017).

Traditional Banking Adaptation to Fintech

Financial institutions must adapt and incorporate the fintechs' technological solutions into their business model particularly investing in IT and upgrading their core platforms (Andrade, 2019). Fintech companies put pressure on established financial companies on margins charged, loss of market share, information security and customer churn (PWC, 2016). Thus, more than half of banks and capital markets institutions have incorporated emerging technologies into commercial banking and personal loans, and an additional 20% plan to do so in the next two years (PWC, 2019). Some of these institutions use the Mergers and Acquisitions (M&A) scheme in order to absorb fintechs into their business model and consequently the M&A activity is growing since 2017 with the Q1+Q2 of 2019 amounting to USD 23.9 billion and about 160 deals completed worldwide (KPMG, 2019a). Currently financial institutions as well as technological, media and telecommunications companies are cooperating in order to create synergies and easily incorporate innovative solutions into their business model. Telecommunications companies have advantage offering customer centric products which have great success, but financial institutions are well-established in the market and have acquired licensing to operate in financial solutions. However, both sectors have a clear focus on customer retention which is the key to succeed, they have different visions on the main aspects of emerging technology to focus in order to do so. Whilst financial institutions prioritize the ease of use and the faster service and processes, telecommunications companies prioritize personal digital contact and personalized service but both sectors are focusing on

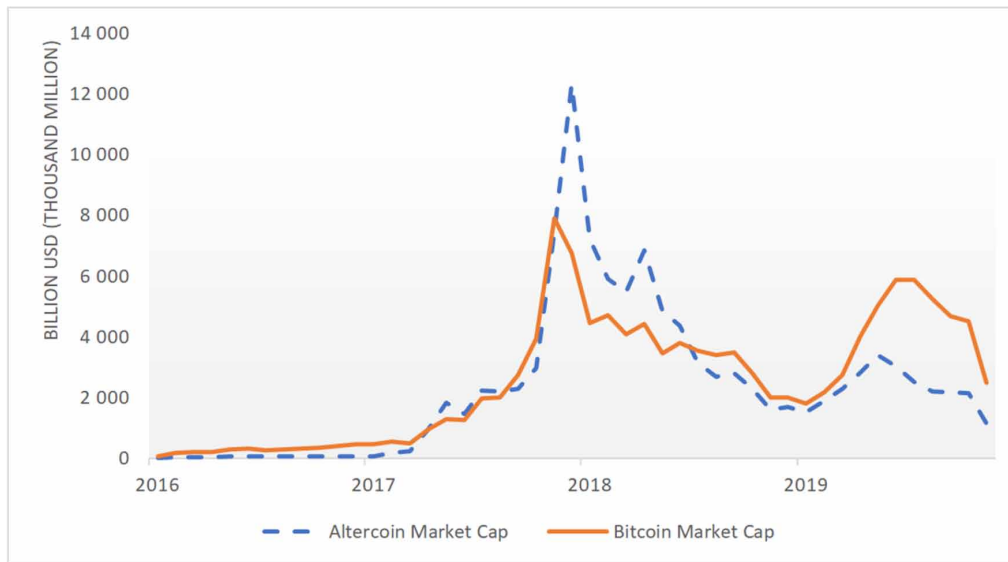
trust (PWC, 2019). This highlights the main weaknesses of both sectors because telecommunications companies lack the close contact to the customer and financial institutions have much heavier processes and less user-friendly platforms than their counterparties. Despite the last financial crisis impact on financial institution's reputation (Vives, 2017), they still have great trust from consumers (EY, 2014) mainly due to the security measures taken and surely they have a great advantage in the activities which involve closer contact with the customer and require a great deal of trust and safety. Therefore, they are seen as having a great advantage of continuing to be privileged financial intermediaries (McKinsey&Company, 2018). It is consensual that financial institutions should focus on several areas in order to survive and be adaptable within the new technology world, namely: (i) becoming digital (Bughin, Deakin, & O'Beirne, 2019); (ii) optimize their business model (e.g. adopting robot advice, digital platforms, partnering with telecommunications companies); (iii) become more cost efficient; (iv) retain customers; (v) be able to attract talent; (vi) focus on specific business segments with tailor made solutions; (vii) being able to keep the pace with regulatory developments (PWC, 2016; Khanna & Martins, 2018; McKinsey&Company, 2018; PWC, 2019).

Fintechs' Deals, Investment and Market Volume by Geography

Geographically, the areas with higher investments in fintech (i.e. investment of Venture Capital, Private Equity and M&A) are the Americas (the United States of America account for 87% of the investment) and Europe followed by Asia Pacific (KPMG, 2019a). However, there are important developments, deals and interest in regions such as China, which is by far the most important country in terms of market volume (Ziegler, et al., 2019), and Russia due to a less developed capital market, less access to loans and capital controls. Concerning fintech hubs the United States of America (USA) and China lead the way by far being London the only European city represented in the top 10 (position 4) of fintech hubs (University of Cambridge, 2018). Globally, in the first half of 2019 fintechs represented an investment of USD 37.9 billion with 962 deals which represents a decrease from 2018 (USD 120 billion and 2590 deals) mainly due to a preference of investors for smaller deals, a decrease in investment in Asia, a more matured market in blockchain, an increase in banks' competitiveness in terms of digitalization and also investment in financial services from big technological companies (KPMG, 2019a). Nevertheless, there is an impressive growth in investment in alternative finance such as ICOs (Brochado, 2018b) and also in cryptocurrencies' market capitalization during the last 3 years (Brochado, 2018a) with an impressive valorization during 2017 and subsequent fall in 2018 followed by a slower valorization in 2019 which although smaller than the one occurred in 2017 is still much above the values previous to the first valorization as per the figure 3.

The year of 2018 registered the highest investment in blockchain and cryptocurrency with USD 5 billion of capital investment and 586 deals whereas the first half of 2019 has registered USD 1 billion and 171 deals (KPMG, 2019a). On 2017, a growth of 184% was registered compared to the previous year on staff active in blockchain industry, tendency maintained in 2018 with a growth of 165% (Q1+Q2) (Rauchs, Blandin, Bear, & McKeon, 2019). Fintech must be prepared for regulatory impacts (EY, 2017) creating ground to the appearance of RegTech, meaning, "any use of technology to match data to information taxonomies that are meaningful to both regulators and the companies they regulate, in order to automate compliance and oversight processes" (Schizas, et al., 2019). Most companies are present in the United Kingdom (UK) and the USA being the continental European representatives, Switzerland and Ireland (Schizas, et al., 2019). Investment in these companies fluctuates but 2018 represented USD 3.9

Figure 3. Market capitalization of bitcoin and altcoins



Source: <https://coin.dance/>

billion of investment and 123 deals whilst the first half of 2019 represented USD 1.5 billion of investment and 53 deals (KPMG, 2019a).

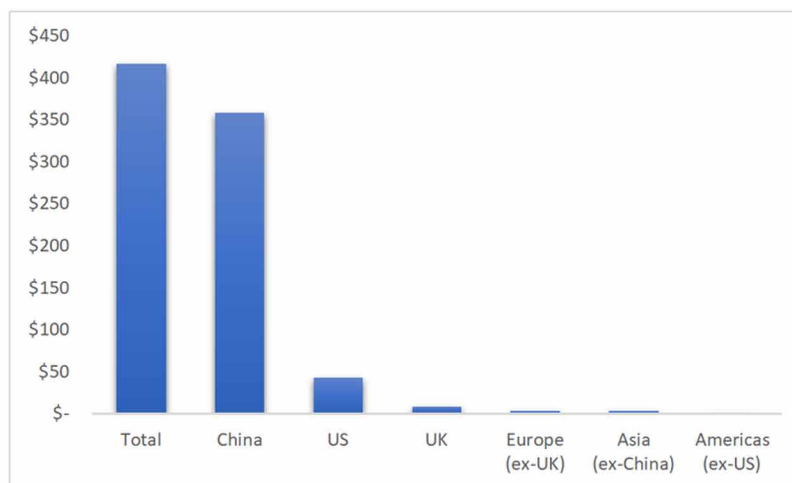
The USA is the largest market for fintech in the Americas and had a market growth of 88.5% each year between 2013 and 2017 representing a market volume of USD 42.81 billion of the global Americas market volume of USD 44.3 billion in 2017. Canada is the second most important market (2% of market volume) in Americas. Latin American countries represent 1% of the total market value (University of Cambridge, 2018a). Concerning investment in the activity, the American market represented USD 55.3 billion in 2018 and the 10 biggest fintech deals in the first half of 2019 also took place in the USA (Dun & Bradstreet, USD 6.9 billion; Investment Technology Group, USD 1 billion). The only two deals outside the USA happened in Canada (Shareworks by Morgan Stanley, USD 843.8 million; Wave Financial, USD 405 million), and Argentina (Prisma Medios de Pago, USD 725 million) (KPMG, 2019a).

In the European continent the UK is by far the largest contributor to the fintech's market volume with EUR 7.07 billion of a total of EUR 10.44 billion in 2017 which represents 68%. The percentage was higher before with 81% in 2015 and 73% in 2016 which means the distance between the UK and the rest of Europe is decreasing (Ziegler, et al., 2019). The market volume of fintech has been constantly increasing in Europe although it is still much smaller than in the USA and Asia (including China). Concerning investment in fintech companies, the European market accounts for USD 13.2 billion and 307 deals which represents a growth tendency, although the values for the first two quarters of 2019 were smaller when compared to the same period of 2018. Most representative deals happening in first half of 2019 happened in Germany (Concardis, USD 6 billion) and France (eFront, 1.3 billion), followed by several UK deals and one single deal in Norway (KPMG, 2019a). In terms of number of platforms operating in Europe the UK leads with 77 platforms, followed by Germany with 46 platforms, France with 46 platforms, Italy with 45 platforms, Spain with 39 platforms and the Netherlands with 32 platforms (Ziegler, et al., 2019).

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China is the country with the highest market volume in the world but lacks in terms of investment. China represents a total of USD 358.3 billion with a global value for the entire Asian market of USD 361.9 billion in 2017. China's market volume growth trend is very clear and has been present since 2013 with a growth from USD 6 billion in this year to USD 358 billion in 2017 (University of Cambridge, 2018). After China, the most significant market volumes in Asia are represented by the counties of Australia (USD 1.5 billion), South Korea (USD 1.13 billion), Japan (USD 348.7 million) and India (USD 268.6 million) (University of Cambridge, 2018). Concerning the investments in fintech the Asian region accounted USD 3.6 billion and 102 deals which represents a growth tendency although with lower values in the first two quarters of 2019. Most relevant deals in the first half of 2019 happened in China (NCF Wealth Holdings, USD 2 billion; Shanghai Dianrong Financial Information Services, USD 100 million), South Korea (Blockchain Exchange Alliance, USD 200 million), Australia (Airwallex, USD 100 million), Indonesia (Akulaku, USD 100 million) and Vietnam (Momo, USD 100 million) (KPMG, 2019a).

Figure 4. Market volume by region in 2017



	Total	China	US	UK	Europe (ex-UK)	Asia (ex-China)	Americas (ex-US)
Market Volume (2017)	\$416.42	\$358.00	\$42.81	\$7.87	\$3.75	\$3.64	\$1.53

The values are in billion (thousand million) USD. The exchange rate 1.11 EUR/USD was applied to the European values. Source: (University of Cambridge, 2018a), (Ziegler, et al., 2019), (University of Cambridge, 2018).

Business Models of Alternative Finance Companies

There are several business models for alternative finance companies which adoption varies depending on the region where platforms are incorporated. As per table 1, lending services dominate in terms of market volume across all regions being the only exception the “invoice trading” in Europe.

Table 1. Business models of Fintech per region with definitions

Americas	
Balance Sheet Consumer Lending	\$ 15.3 billion
P2P Consumer Lending	\$ 14.9 billion
Balance Sheet Business Lending	\$ 7.3 billion
Europe	
P2P Consumer Lending	\$ 1.56 billion
Invoice Trading	\$ 597 million
P2P Business Lending	\$ 520 million
Asia	
P2P Consumer Lending	\$ 225 billion
P2P Business Lending	\$ 98 billion
P2P Property Lending	\$ 6.6 billion

Source: (University of Cambridge, 2018a), (Ziegler, et al., 2019), (University of Cambridge, 2018).

Balance Sheet Consumer Lending	The platform entity provides a loan directly to a consumer borrower.
P2P Consumer Lending	Individuals or institutional funders provide a loan to a consumer borrower.
Balance Sheet Business Lending	The platform entity provides a loan directly to a business borrower.
Invoice Trading	Individuals or institutional funders purchase invoices or receivable notes from a business at a discount.
P2P Business Lending	Individuals or institutional funders provide a loan to a business borrower.
P2P Property Lending	Individuals or institutional funders provide a loan secured against a property to a consumer or business borrower.

METHODOLOGY

This research aims to perform a systematic literature of current fintech research and to answer the question: What insights does current literature offer regarding the impact of fintech developments in the business model of the banking sector? A research on “banking” and “fintech” as search terms in the abstract, title or keywords in the database SCOPUS allowed the record of 100 relevant studies published in English. The search code used was (TITLE-ABS-KEY (bank AND fintech) OR TITLE-ABS-KEY (bank AND “Initial Coin Offerings”) OR TITLE-ABS-KEY (bank AND crowdfunding) OR TITLE-ABS-KEY (bank AND digitalization) OR TITLE-ABS-KEY (bank AND “robot advice”) OR TITLE-ABS-KEY (bank AND blockchain) OR TITLE-ABS-KEY (bank AND “artificial intelligence”) OR TITLE-ABS-KEY (bank AND “big data”) OR TITLE-ABS-KEY (bank AND “smart contract”) OR TITLE-ABS-KEY (bank AND “digital platform”) OR TITLE-ABS-KEY (bank AND “digital transformation”) OR TITLE-ABS-KEY (bank AND “virtual currency”) OR TITLE-ABS-KEY (bank AND cryptocurrency)) AND (LIMIT-TO (SUBJAREA, “BUSI”)) AND (LIMIT-TO (LANGUAGE, “English”)) AND (LIMIT-TO (DOCTYPE, “ar”) OR LIMIT-TO (DOCTYPE, “re”)). The search was not restricted to chronological limits and was able to collect 102 papers but 2 of them focused on a different field of research, namely, medicine, and thus considered not relevant. Therefore, the 100 relevant papers have a date range from 2011 to 2019 excluding the year of 2013 where no paper was found. The papers from older years (i.e. 2011-2014) focus particularly on topics such as digital transformation, big data, crowdfunding or predictive models, respectively. Only in 2015 the fintech topic explicitly appears and in 2016 the research continues and expands also to blockchain related topics. The great majority of the papers are very recent and 85% were published between the years of 2017-2019. The information for each paper was recoded

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into an Excel spreadsheet, comprising the following columns: title of the paper, year, abstract, keywords, authors, authors' affiliations, and journal. The data was treated in Excel and complemented with further information when needed in order to have a more rigorous analysis. The authors also used the Scimago Journal and Country Rank in order to obtain quartiles and countries of several Journals analyzed.

This study adopted a hybrid design comprising the systematic qualitative review methods and narrative, supplemented by semantic network analysis. Using a systematic method, the authors document the geographical spread of the papers by author, year, research methods, and primary topical areas, thus providing a reproducible and reliable assessment of current progress in the research field. The narrative discussion indicates the research production within each of the topical areas, explores emerging themes and methods, and identifies knowledge gaps for future research directions. A semantic network analysis further explores connections among key topical areas. The authors also content-analyzed the papers' abstracts through Leximancer, a software program that automatically extracts semantic networks from qualitative data. Leximancer identified the connections among topics, having been successfully employed for literature review (Crofts & Bisman, 2010). This software generates conceptual maps based on co-occurrences of words in keyword lists. The analysis' reliability is secured by its stability (i.e., intercoder reliability) and reproducibility (i.e., high consistency in the way data are coded).

In order to make the research process clearer the authors developed a summary table with the procedures and steps taken in order to obtain the final results. Table 2 summarizes the steps but also the actions taken in each step and the outputs obtained.

Table 2. Summary of the procedures and steps taken along the research process

Procedure	Actions taken	Results
1. Perform a search on SCOPUS		
1.1. Select the search criteria (e.g. key-words, language, research field)	Work with SCOPUS in order to obtain the final code line	Code line providing the final results
1.2. Select the data to export (e.g. abstract, authors, journal's name)	Work with SCOPUS and select the relevant information	Final data selected
1.3. Export the results to a CSV file	Export the results to a CSV file and treat it in Excel	CSV file to be treated in Excel
2. Analyze the data collected		
2.1. Analyze the data exported and select relevant papers	Transform the CSV file into a workable Excel file and check data consistency. For example, be sure that all the papers collected are relevant	Workable Excel file
2.2. Complete the data if some consistency is necessary (e.g. DOI missing, authors missing)	Complement the data obtained due to possible missing information	Final Excel file
2.3. Complete the data with the information on journals' ranking from Scimago	Cross-check information with Scimago in order to complement the data obtained	Further information on the Excel file
3. Descriptive analysis		
3.1. Perform simple statistics on the data collected (e.g. number of articles per journal, leading institutions or countries)	Select the data necessary and perform simple statistics	Summary statistics tables
4. Analysis of key-words		
4.1. Perform statistics on the most frequent key-words used by the authors	Select the necessary data and perform simple statistics	Summary statistics tables
4.2. Build a word-cloud with the most frequent key-words	Select a software and build a word-cloud having into consideration the most relevant key-words	Word-cloud
5. Leximancer analysis		
5.1 Run Leximancer software based on the abstracts collected	Input the data collected from SCOPUS and program Leximancer	Outputs from Leximancer (i.e. conceptual map)
5.2 Analyze Leximancer's results including the final conceptual map	Download all the software's results and analyze them	Conceptual map analysis complemented by the remaining
5.3. Connect Leximancer's results with the literature	Deeply analyze the papers collected by its themes and connect them with the conceptual map	Final analysis connecting the papers collected with the Leximancer's results

RESULTS AND DISCUSSION

Number of Articles by Journal

Table 3 depicts the top 17 institutions publishing papers on this topic. The authors have selected a top 17 given the relevance of global results obtained because below the 17th institution analyzed the publications decreased to 1 and therefore became less relevant for the analysis. Besides, the top selected represents 47 of the 100 papers studied.

The institutions publishing more research about the banking and fintech topic are the journals *Financial Innovation*, *European Research Studies Journal* and the *Journal of Payments Strategy and Systems*. These institutions together published a total of 32% of the papers. There is an increasing interest on the topic and from 2018 onwards the papers published doubled when compared to the period between 2011 and 2017. Furthermore, there are more institutions publishing papers on this topic during most recent years which is confirmed by the fact that most of them have not published any paper between the years of 2011 and 2017 on the same topic. Further to this analysis, the authors used Scimago in order to find the journals' country of origin and also the quartile to which they belong according to Scimago Journal and Country Rank.

Most journals belong to the quartiles (Q) 1 and 2. The Q1 represents 23% of top journals and Q2 29%. Q3+Q4 together represent 38% of top journals publishing about this topic with only one journal belonging to the Q4. Only 4 journals were not included in the Scimago ranking and thus cannot be considered in the current analysis. Concerning the journals' origin, most of them are from the Netherlands, the USA and the UK. The top 17 journals include 2 open source journals from China and India.

Leading Institutions with the Most Number of Authors

The authors have also collected information on institutions publishing articles on this topic dividing them into "Academic" and "Non-academic".

There is a much higher number of authors and institutions publishing papers in more recent years than on the previous period between the years of 2011 and 2017 according to table 5. The top three institutions publishing research on the topic are the University of Latvia (Latvia), University of Jyväskylä (Finland) and the York University (Canada). Together they have published a total of 19 articles since 2011 and therefore represent 34% of the papers published by the top institutions. There is a clear tendency for the dominance of the academia concerning the publication of research. From all the 245 institutions studied 217 are academic. Nevertheless, there is also an increasing interest of non-academic institutions as only 4 institutions have published research between the period of 2011-2017 and since 2018 the number increased to 24. Among the non-academic institutions, mostly are consulting companies, central banks, national public agencies, technology companies and a law company. Most of the interest comes from central banks and national public institutions. Besides, consulting companies seem to be cultivating the interest on these topics as they are trendy and most likely profitable. A law company from New York, namely White&Case, is among the leader institutions in terms of authors.

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Table 3. Number of articles by Journal

	2011-2017	2018-oct, 2019	Total
<i>FI</i>	6	0	6
<i>ERSJ</i>	2	3	5
<i>JPSS</i>	0	4	4
<i>JEB</i>	0	3	3
<i>BH</i>	2	1	3
<i>FRBSLR</i>	0	3	3
<i>SC</i>	2	1	3
<i>IJeBE</i>	0	2	2
<i>IJFR</i>	0	2	2
<i>BBS</i>	0	2	2
<i>CE</i>	1	1	2
<i>QAS</i>	1	1	2
<i>EM</i>	0	2	2
<i>IEEEP</i>	2	0	2
<i>JFE</i>	0	2	2
<i>IJRTE</i>	0	2	2
<i>EBOLR</i>	0	2	2
Total	16	31	47

Note: FM = Financial Innovation; ERSJ = European Research Studies Journal; JPSS = Journal of Payments Strategy and Systems; JEB = Journal of Economics and Business; BH = Business Horizons; FRBSLR = Federal Reserve Bank of St. Louis Review; SC = Strategic Change; IJeBE = International Journal of e-Business Research; IJFR = International Journal of Financial Research; BBS = Banks and Bank Systems; CEQ = Contemporary Economics; QAS = Quality - Access to Success; EM= Electronic Markets; IEEEP = IEEE Potentials; JFE = Journal of Financial Economics; IJRTE = International Journal of Recent Technology and Engineering; EBOLR = European Business Organization Law Review

Table 4. Journals' Country and Rank by Scimago

	Quartile	Country
<i>FI</i>	Not available	China
<i>ERSJ</i>	Q2	Greece
<i>JPSS</i>	Not available	United Kingdom
<i>JEB</i>	Q2	Netherlands
<i>BH</i>	Q1	Netherlands
<i>FRBSLR</i>	Q2	United States of America
<i>SC</i>	Q2	United Kingdom
<i>IJeBE</i>	Q4	United States of America
<i>IJFR</i>	Not available	Canada
<i>BBS</i>	Q3	Ukraine
<i>CE</i>	Q3	Poland
<i>QAS</i>	Q3	Romania
<i>EM</i>	Q1	Germany
<i>IEEEP</i>	Q3	United States of America
<i>JFE</i>	Q1	Netherlands
<i>IJRTE</i>	Not available	India
<i>EBOLR</i>	Q2	Netherlands

Note: FM = Financial Innovation; ERSJ = European Research Studies Journal; JPSS = Journal of Payments Strategy and Systems; JEB = Journal of Economics and Business; BH = Business Horizons; FRBSLR = Federal Reserve Bank of St. Louis Review; SC = Strategic Change; IJeBE = International Journal of e-Business Research; IJFR = International Journal of Financial Research; BBS = Banks and Bank Systems; CEQ = Contemporary Economics; QAS = Quality - Access to Success; EM= Electronic Markets; IEEEE = IEEE Potentials; JFE = Journal of Financial Economics; IJRTE = International Journal of Recent Technology and Engineering; EBOLR = European Business Organization Law Review

Table 5. Leading institutions with the greatest number of authors

	2011-2017	2018-oct, 2019	Total
University of Latvia	1	6	7
University of Jyväskylä	0	6	6
York University	0	6	6
White&Case	0	5	5
SRM Institute of Science and Technology	0	4	4
Rostov State University of Economics	0	4	4
Tarbiat Modares University	0	4	4
Karlsruhe Institute of Technology	0	4	4
Universitas Padjadajaran	0	4	4
Sun Yat-sen Business School	4	0	4
University of Zurich	4	0	4
University of Piraeus	4	0	4
Total	13	43	56

Table 6. Institutions' classification

	2011-2017	2018-oct, 2019	Total
Academic	68	149	217
Non-Academic	4	24	28
Total	72	173	245

Leading Countries for Papers and Authors

A relationship between countries-papers published and countries-authors was also established. Tables 7 and 8 depict these relationships and confirm the pattern between them. In both cases the top 3 countries in terms of authors and papers published belong to the USA, UK and Germany. These countries represent a total of 56% of the papers published and 52% of the authors. China is in the top of countries with the most authors, but India and Russia are in both rankings (authors and papers published). Lastly, Russia is present in both rankings and Switzerland in the countries for papers published ranking. Concerning Switzerland, it is interesting to notice that it represents a prosperous country for fintechs in Europe. This fact might be due to its strict laws which may work as safeguard for future expansion and also due to the fact that Switzerland is friendly to new technology innovation and a country historically known by its well-established banking sector.

Table 7. Leading countries for papers published

	2011-2017	2018-oct, 2019	Total
United States of America	5	12	17
United Kingdom	4	8	12
Germany	3	8	11
India	2	4	6
France	2	3	5
Spain	0	5	5
Russia	2	2	4
Canada	2	2	4
Switzerland	3	1	4
Italy	0	4	4
Total	23	49	72

Table 8. Leading countries for authors

	2011-2017	2018-oct, 2019	Total
United States of America	6	27	33
Germany	4	20	24
United Kingdom	4	13	17
India	5	9	14
France	4	7	11
Romania	3	7	10
Spain	0	9	9
Russia	3	6	9
Italy	0	8	8
China	8	0	8
Total	37	106	143

Word Cloud with Most Frequent Keywords

The top three words of papers published are interconnected and constitute the real challenge for the banks' business model. Considering the word cloud in figure 5, it is visible that the most used keywords are banking, fintech and digital followed by the words finance, technology, lending and financial services, respectively. Therefore, the authors conclude that the most prominent topic in today's literature is the relation between the banks and fintechs.

Table 9. Table with Most Frequent Keywords

	Frequency	Percentage
Banking	51	11%
Fintech	37	8%
Digital	36	8%
Finance	29	7%
Technology	29	7%
Lending	28	6%
Financial service	27	6%
Big data	21	5%
Innovation	17	4%
Regulation	17	4%
Blockchain	15	3%
Crowdfunding	15	3%
Payments	15	3%
Economics	13	3%
Markets	13	3%
Investment	12	3%
Strategy	11	2%
Digital transformation	9	2%
Information	9	2%
Artificial intelligence	7	2%
Bitcoin	7	2%
Machine learning	7	2%
Cryptocurrency	5	1%
Peer-to-peer lending	5	1%
Platform	5	1%
Secutiry	5	1%
Total	445	100%

The size of the circles, its color and centeredness represent concepts' importance in the dataset. Therefore, most central, seemingly red-colored and bigger circles are the most important in the dataset at the same time that the lines connect the related concepts. A total of 10 key themes are represented in the map with their respective concepts' groups of related topics. In line with what was previously found, the authors conclude that most central concepts are the "banks" (count: 201; relevance: 100%), "technol-

Table 10. Systematization of themes, papers and main findings

Theme	Leximancer's Relevance	Papers	Main findings
Banks	100%	Anagnostopoulos, 2018; Auvinen, et al., 2019; Belanche, Casaló, & Flavián, 2019; Bömer & Maxin, 2018; Coetzee, 2018; Drasch, Schweizer, & Urbach, 2018; Frias & Freire, 2019; Gohary, 2019; Gonzalez, 2019; Harvey & Branco-Illodo, 2019; Iman, 2019; Kim & Hann, 2019; Kovanen, 2019; Lavrinenko & Shmatko, 2019; Mehar, et al., 2019; Micheler & Whaley, 2019; Min, 2019; Nigam, Mbarek, & Benetti, 2019; Semenyuta, Andreeva, Sichev, & Filippov, 2019; Wolf & Redford, 2019; Jakšič & Marinč, 2019	(i) Banks are being challenged by new incumbents. (ii) Fintechs are expanding and offering substitute products reaching populations to whom the traditional services are expensive or hard to access. (iii) Banks are trying to adapt to this new competition and mainly partnering with fintechs. (iv) The existence and adoption of new technologies will impact traditional banking's structures such as less allocation of operational resources, a need for specialized work and leaner processes. (v) Cryptocurrencies are also impacting banks and central banks. Their proliferations urges for regulation.
Technology, use and system	41%, 35%, 17%	Addo, Guegan, & Hassani, 2018; Anagnostopoulos, 2018; Gohary, 2019; Gonzalez, 2019; Hassani, Huang, & Silva, 2018; Kovanen, 2019; Micheler & Whaley, 2019; Procházka, 2018; Stewart & Jürjens, 2018; Yoon & Jun, 2019; Ashta & Biot-Paquerot, 2018; Belanche, Casaló, & Flavián, 2019	(i) The theme use is closely related with the use of technology and is not relevant on its own. (ii) The use of technology is related with the use of blockchain systems. That is the reason to the association of the theme system. (iii) Technology is associated to fintechs and the products they offer. (iv) Literature states that blockchain is the main technology breakthrough behind the fintechs' success. (v) Traditional banks need to adapt to this technological developments.
Services	32%	Anagnostopoulos, 2018; Anagnostopoulos, 2018; Döderlein, 2018; Drasch, Schweizer, & Urbach, 2018; Larios-Hernández, 2017; Passi, 2018; Romanova, Grima, Spiter, & Kudinska, 2018; Stewart & Jürjens, 2018; Yoon & Jun, 2019; Zalan & Toufaily, 2017	(i) Refers to traditional financial services offered by banks and currently fintechs. (ii) Banks are under pressure from the market and fintech companies to offer innovative digital services. (iii) Although the regulation might be a burden it has been eased in order to facilitate banks to adopt innovative measures. (iv) The fintechs are used mostly by young and educated people being very fruitful in developing markets in which they allow the access to financial services.
Market, crowdfunding and finance	27%, 19%, 14%	Brown, Boon, & Pitt, 2017; Cumming, Meoli, & Vismara, 2019; Hoegen, Steininger, & Veit, 2018; Kim & Hann, 2019; Nigam, Mbarek, & Benetti, 2019; Prakash, Reddy, & Vasaswi, 2019; Zilber, Silveira, Carvalho, & Imbrizi, 2016	(i) The themes finance (financial services and financing), market (financial markets) and crowdfunding are interconnected with predominance for crowdfunding. (ii) Crowdfunding is also considered an alternative financing source which had an important increase because it overcomes the usual difficulties in the traditional financing forms.
Digital	22%	Bantouna, Poullos, Tsagkaris, & Demestichas, 2014; Japparova & Rupeika-Apoga, 2017; Larios-Hernández, 2017; Liu, Chen, & Chou, 2011; Meena, Sriram, & Sundaram, 2017; Zalan & Toufaily, 2017	(i) Connected with the themes technology and service once digital is related with the appearance of disruptive digital services. (ii) Traditional banks need to become digitalized in order to remain competitive. (iii) The digitalization of the economy is possible due to large amounts of data available. (iv) There are concerns about the digital inclusion but clearly digital services promote entrepreneurship and the financial inclusion of populations in less developed markets.
Investment	16%	Bodislav, Bran, & Popescu, 2018; Hoegen, Steininger, & Veit, 2018; Jung, Dörner, Weinhardt, & Puszma, 2018; Sigo, et al., 2018; Brown, Boon, & Pitt, 2017	(i) Refers to the alternative ways of investment which differ from the traditional ones. (ii) Literature refers to automated investment counseling and the use of big data in the investment process.

A further analysis revealed that the theme “banks” is related with the need to adapt to new circumstances because they are clearly being challenged by new incumbents (Jakšič & Marinč, 2019). Fintech companies offer substitute products to the traditional banking and with their new solutions can even reach populations to whom banks’ service is expensive and hard to access (Kim & Hann, 2019; Nigam, Mbarek, & Benetti, 2019) being fintechs very important in less developed markets (Coetzee, 2018). Banks are adapting to digital solutions, having most of them a robust readiness for their adoption, (Auvinen, et al., 2019). Banks are competing but mainly partnering (Bömer & Maxin, 2018; Drasch, Schweizer, & Urbach, 2018) with fintechs which were already born digital (Iman, 2019). The adoption to new technologies such as blockchain (Min, 2019), big data and robot-advisors (Belanche, Casaló, & Flavián, 2019) will have impacts in the traditional banking structures (Semenyuta, Andreeva, Sichev, & Filippov, 2019), for instance, the need for very specialized work and less need for resources allocated to operational teams (Lavrinenko & Shmatko, 2019). Nevertheless, the implementation of these solutions will have also a strong positive impact replacing complex and costly banking processes (Gonzalez, 2019) and facilitating several banking services such as payments (Gohary, 2019). The literature also highlights the need to foster entrepreneurship within banks’ subsidiaries in order to nurture innovation and also to empower them to reinvent themselves (Wolf & Redford, 2019). Impacting banks and central banks

are also the cryptocurrencies which have proliferated during the last years (Kovanen, 2019; Mehar, et al., 2019) and which advocate for more privacy (Harvey & Branco-Illodo, 2019) and independence from the central banks (Frias & Freire, 2019). These facts also urged for more regulation in fintech and cryptocurrencies' markets (Anagnostopoulos, 2018; Micheler & Whaley, 2019).

The theme "services" is mainly referred in the literature to identify financial services offered traditionally by banks and currently also by fintechs (Zalan & Toufaily, 2017; Anagnostopoulos, 2018). Literature confirms banks are under pressure to offer innovative and digital services which go in line with consumers' demands (Drasch, Schweizer, & Urbach, 2018; Yoon & Jun, 2019). The authors also confirmed that this innovation is considered to have positive effects on consumers and regulators (Anagnostopoulos, 2018). This pressure does not only come from fintech companies but also from the market which has been more flexible and prone to creating innovative services (Romanova, Grima, Spiter, & Kudinska, 2018). Although the regulation may still be seen as a burden to innovation (Döderlein, 2018), the new European Payment Services Directive (PSD2) regulation is an example of a regulatory measure which intends to increase the consumer protection at the same time that tries to homogenize and make the payment market more efficient (Passi, 2018). Literature also reveals that the fintech services, although clear substitutes to traditional banking, are still mostly used by younger and higher educated people (Stewart & Jürjens, 2018) being very fruitful in developing markets where the access to traditional financial services is very limited (Larios-Hernández, 2017).

Literature associates the theme "technology" with the fintech companies (Belanche, Casaló, & Flavián, 2019) and innovative services provided by them (Yoon & Jun, 2019) mostly related with payments (Kovanen, 2019). Insights are also provided on the impacts fintech technology has on traditional services (Anagnostopoulos, 2018; Gohary, 2019). The theme technology is frequently interconnected with the topic blockchain through the theme system. Therefore, the literature assumes blockchain systems have been the main technological breakthrough behind the recent fintech innovation (Gonzalez, 2019) and relates it with the expansion of technology and with a real disruption in the monetary system (Ashta & Biot-Paquerot, 2018). The banking system is already adopting technological solutions, such as blockchain (Hassani, Huang, & Silva, 2018), in order to keep up the pace with their competitors (Addo, Guegan, & Hassani, 2018; Stewart & Jürjens, 2018). Nonetheless, new technological solutions, pose a challenge to regulation which has been increasing in this area (Procházka, 2018) with the example of the Bank of England adopting itself digital solutions for regulatory purposes (Micheler & Whaley, 2019). The theme "digital" also appears in line with both previous themes as it is related with the appearance of new disruptive digital services (Zalan & Toufaily, 2017) and the need to adopt digital solutions (Liu, Chen, & Chou, 2011). The literature focuses on banks and states that digitalization processes are crucial for banks to guarantee their own development (Japparova & Rupeika-Apoga, 2017). The economy's digitalization is possible due to large amounts of data available and the capacity to process it (Bantouna, Poullos, Tsagkaris, & Demestichas, 2014). Nevertheless, digitalization raises also some concerns regarding exclusion because there is a clear positive correlation between age and income and the utilization of digital solutions (Meena, Sriram, & Sundaram, 2017). However, the new digital financial services are able to promote entrepreneurship and also financial inclusion (Larios-Hernández, 2017). The usage of the new technological financial services, the use of data and digital solutions are clearly increasing being the main reason for the existence of the theme use.

The themes "market", "finance" and "crowdfunding" appear interconnected in the literature. The theme "market" refers mainly to financial markets and the theme "finance" mainly refers to the financial services and to the financing of companies and investments. Crowdfunding is also associated with a type

of market and an alternative way of financing projects (Zilber, Silveira, Carvalho, & Imbrizi, 2016; Kim & Hann, 2019). Crowdfunding is defined as a way used by “organizations and individuals to obtain investments they otherwise might not receive from more traditional sources such as banks, angel investors, and stock markets” (Brown, Boon, & Pitt, 2017, p. 1). There is an increase in the financing by crowdfunding (Prakash, Reddy, & Vasaswi, 2019) because it is a way of overcoming financing difficulties in projects which are unable to obtain financing via traditional forms (Cumming, Meoli, & Vismara, 2019; Nigam, Mbarek, & Benetti, 2019). The volume of crowdfunding increased 1000% in a small number of years and it is nearly outpacing the worldwide venture capital spending (Hoegen, Steininger, & Veit, 2018).

Finally, the literature refers the theme “investment” and associates it with alternative ways of investment (Brown, Boon, & Pitt, 2017). These alternative forms have different decision-making processes compared to the traditional ones (Hoegen, Steininger, & Veit, 2018). Furthermore, the literature refers new ways of automated investment counseling such as robot-advisor systems (Jung, Dorner, Weinhardt, & Puzmaz, 2018) and the use of big data in investment processes as a way of making better decisions (Bodislav, Bran, & Popescu, 2018; Sigo, et al., 2018).

The entire map proves the idea that the central topic is still banks and the services they offer which are being challenged by substitute products offered by new incumbents. Fintechs are prone at providing a consumer-focused service and therefore, there is a strong interest in topics such as technology which is identified as a future’s trend and with new frameworks’ development within fintech companies. These new revolutionary services are mostly digital and based on blockchain system which has captured banks’ attention which have adopted some of fintech’s processes mainly through cooperation. Although the traditional financial institutions are struggling to keep pace with innovation, they are putting the best effort on this in order to guarantee their survival.

Table with the Methodologies Used

The current section is dedicated to the analysis of the methodologies used in the papers considered for this research. The authors have divided the methodologies into: literature review; quantitative; qualitative; mixed; conceptual (e.g. new model); experimental. Furthermore, the type of data is analyzed and divided into: primary; secondary; both types of data. A summary of the analysis can be found in table 11.

The authors have concluded that the majority of the papers fit into the methodology of the literature review representing a total of 42 papers. The second type of research representing 29 papers of the sample is the quantitative research followed by the qualitative research methodology used in 23 of the sample papers. The remaining approaches still have low significance but there are mixed methods approaches, conceptual frameworks and experimental researches on this topic. The mostly used type of data is secondary data mainly due to the literature review papers but also due to the quantitative research which uses mainly this type of data. In sum, the secondary data is used in 77 of the papers analyzed while the primary data is used in 20 of the papers analyzed with a reduced number of papers using both types of data which accounts to 3 of the papers analyzed.

Table 11. Summary of the methodologies used

Methods	Papers	Secondary data	Primary data	Both data
Literature Review	42	42	0	0
Quantitative	29	23	4	2
Qualitative	23	9	14	0
Mixed	3	1	1	1
Conceptual	2	2	0	0
Experimental	1	0	1	0
Total	100	77	20	3

CONCLUSIONS AND FURTHER RESEARCH

Main Conclusions

The aim of this paper was to answer the following research question: what insights does current literature offer regarding the impact of fintech in the banking sector? Accordingly, the authors developed a systematic literature review. Fintech are gaining relevance in the last years as concluded by the analysis of Google Trends' data and also by the literature analysis. Internet interest on this topic has increased as well as the number of articles published and the number of authors, journals, private institutions and universities interested in the topic.

The literature proves that the USA, the UK and Germany are the most relevant countries in terms of research on current topic. These are the most important markets for the fintech (after China) and also the ones with the most developed educational system. Despite having several active authors interested on fintech and the Journal which publishes the most, China is still behind several countries in terms of authors and publications, namely, the emerging markets for fintech such as Germany, Italy, Spain, Eastern Europe and India. The most cited words in papers' keywords are consistent with current state of the fintech/banking market. The most prominent topics focus on banks, fintechs and finance. The interest is clear on services provided by fintech which are mostly similar to traditional banking's ones. Hence, there is strong interest in payments, financial services, lending and currency. Together with these concepts are technological ones such as big data, blockchain, artificial intelligence, data transformation and machine learning. The analysis also highlights the focus on regulation. Leximancer's concept map and literature associated with it proves the conclusions already found through the snapshot done previously.

Previous studies revealed that fintechs are indeed direct competitors of traditional financial institutions since they offer substitute products (PWC, 2016; Vives, 2017), while technological companies have the strong advantage of being completely digitalized, offering services and products in a much faster and cheap manner than financial institutions (PWC, 2019). Traditional financial institutions, particularly the banks, have a heavy burden of old processes and costly business models based on fees (Chiorazzo, D'Apice, DeYoung, & Morelli, 2018; Gomber, Kauffman, Parker, & Weber, 2018). After the last financial crisis (2007-2008) banks jeopardized their reputation and fintechs expanded based on the idea that there is no need for third party intermediation with blockchain based systems which can

ultimately substitute central banks' role as currency issuers. Previous studies also stated that although fintechs have expanded and currently pose a direct threat to traditional banking they are not considered clear substitutes though (Roland Berger, 2018). Nonetheless, they are considered disruptive innovators and are forcing banks to rapidly adapt (Deloitte, 2017; PWC, 2019). Hence, banks are adapting in order to change their processes and focus on consumers' needs taking advantage of the trust on traditional and regulated institutions (EY, 2014). Banks are dealing with fintechs through acquisition or collaboration (KPMG, 2019a; PWC, 2019). Banks recognize the importance of concepts such as data, digital and technology and the necessity of integrating them onto their business model (Addo, Guegan, & Hassani, 2018; Hassani, Huang, & Silva, 2018; PWC, 2019). Simultaneously, fintech market is expanding and its three most relevant regions are China, the USA and the UK. Although the European market is expanding (e.g. in Germany, France, Italy, Spain or Netherlands) the UK is clearly the center for the European innovation in fintechs. The USA are an important market for fintechs but China is today the most prominent one globally.

Avenues for Future Research

Future studies on banks' digital transformation should focus on technologies and systems used in fintech industry currently being adopted by banks (e.g. blockchain, robot-advising, big data). Banks are thriving to adopt new technologies and solutions in order to improve old processes and remain competitive which is key to their survival and maintenance as key players in the financial industry. Therefore, technologies adopted and their purposes are of high importance. For instance, which is the use of blockchain in traditional banking and what risks and advantages does it pose? Have the banks adopting these technologies become more competitive and have they attracted more consumers? Besides pure fintech technologies, future studies should also focus on banks' adoption of digital solutions (e.g. home banking applications, digital customer support). Are banks offering more digital solutions to their clients? What is the percentage of traditional banks' clients actively using digital solutions and in what depth do they use them?

Financial institutions have several ways of dealing with fintechs but a model of cooperation has been preferred because it seems to allow traditional companies to easily adopt fintechs' technological solutions (Roland Berger, 2018; PWC, 2019). A future study on the models used by traditional financial institutions to deal with fintechs would be of interest. Which models have been adopted in the relation between traditional institutions and new incumbents? Do models of cooperation produce better results? Who has benefited the most with the cooperation?

The authors have found that new financial services still benefit from more permissive regulation than traditional banks (EY, 2018; Desai, V, V, & Jayakumar, 2019). Traditional institutions can benefit from regulation because it increases trust on them, but it may also jeopardize much of the innovation. There are also signs of openness in regulators in order to allow the traditional banks to adopt innovative solutions. Studies on regulation and the way it affects the new incumbents are interesting. Is regulation (or the lack of it) favoring fintech? How can fintechs protect and adapt themselves to possible future regulatory measures? Are banks taking advantage of regulatory openness?

There is clear evidence that investments are taking different forms and are also becoming digital due to the existence of new solutions and new markets which are replacing the traditional ones (Brochado, 2018b; Hoegen, Steininger, & Veit, 2018; Cumming, Meoli, & Vismara, 2019; Nigam, Mbarek, & Benetti, 2019; Prakash, Reddy, & Vasaswi, 2019). Examples of these new investments are crowdfunding and more recently the Initial Coin Offerings (ICOs) which use virtual currencies and tokens to attract investment.

Therefore, further studies should also focus on studying the success factors of new fintech companies and in particular the success factors of these new investment vehicles. Which are the success factors of a completely digital company offering financial services? Which are the success factors of campaigns such as the ICOs which are completely digital, using virtual currencies and with a global reach?

MAIN RESEARCH LIMITATIONS

The database collected from SCOPUS is limited to 100 relevant papers and the great majority of them were published in the last 3 years. The conclusions would be stronger if a larger database was available and also if an older track record existed. In other words, this would result in more bibliography as well as an established group of researchers and consequently more consistency of the results. The current research is limited to a search on SCOPUS database. Consequently, it could be enlarged if other indexes are cross-checked among them and the number of articles included is increased. The SCOPUS search was limited to papers written in English for the sake of comparison among them and an easy and unbiased analysis. Although the largest majority is written in English several papers were lost in the analysis and consequently important information might also be lost. The search on SCOPUS is performed selecting several combinations of words which result in a final list of papers. Although the authors think that the sample is relevant, they might have not included important words to the search on the platform and thus some papers might not have been included in the analysis. The novelty of the topic is also cause of constant changes in concepts and market data. Therefore, the data presented in the theoretical framework might be outdated soon and requires constant updates to be relevant. This limitation increases due to the volatility of fintech business and constant valorization and depreciation of cryptocurrencies.

In sum, fintechs are clearly reshaping the traditional market of financial services by offering digital solutions and customer centric products. Traditional institutions are adapting to this new reality and are adopting technological solutions in order to remain competitive. Future studies on these topics will be important to understand how the market is moving and what the impacts of innovation are.

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KEY TERMS AND DEFINITIONS

Altcoins: These refer to alternative coins to bitcoin. They surged after the bitcoin and are based on the same technology.

Cryptocurrency: Virtual currency not controlled by a central authority and which constitutes a digital asset. These currencies work usually through a blockchain technology.

Financial Institution: Every company which engages in businesses which deal with financial or monetary transactions. Banks are included into this category as well as financial intermediaries or wealth managers.

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Fintech: Technological company providing financial services which are complementary and most times substitutes to the ones offered by traditional banking sector. These companies are characterized by its high investment in new digitalized business models.

Investment: In this chapter, investment means the amount invested in Fintech companies via several strategies, namely, venture capital or mergers and acquisitions (M&A).

Market Volume: Market volume refers to the total amount of transactions concluded in a determined period, for instance, the transactions amount which Fintech concluded in a specified market for a determined period.

P2P: Peer to peer activities are used to avoid intermediaries in the process because lender and borrower match without the need of an intermediary bank.


RegTech: Technological company specialized in the offer of new technological solutions in order to meet regulatory requirements.

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Chapter 13

Adoption of Financial Technology in Islamic Crowd–Funding: Predicting Small and Medium–Sized Enterprises’ Intention to Use the Investment Account Platform

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ABSTRACT

The purpose of this chapter is to examine the factors that influence small and medium-sized enterprises’ (SMEs) intentions to use the investment account platform (IAP) based on technology acceptance model (TAM). The central hypothesis for this chapter was that SMEs’ intentions to use IAP were a result of perceived usefulness and perceived ease of use. This chapter also suggested that perceived ease of use and intention was mediated by perceived usefulness of the IAP. Using primary data collection method, 163 questionnaires were collected from SMEs in Kuala Lumpur, Malaysia using the purposive sampling technique. The data were analysed using SPSS and SmartPLS. The chapter found that perceived ease of use had significant influences on SMEs intention to use the IAP while perceived ease of use significantly affected perceived usefulness and the relationship between perceived ease of use and intention was mediated by perceived usefulness of the IAP. The results of this chapter suggested strategies to promote the platform as a fund seeking platform for SMEs.

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INTRODUCTION

Financial technology (Fintech) is a combination of an innovative business model and technology solution in facilitating daily financial services. Fintech is a complex ecosystem that covers a large scope of techniques from data security to financial service deliveries (Gai, Qiu, & Sun, 2017; PwC, 2016). The emergence of Fintech has brought about tremendous development in the digital economy, especially in China, India, the United Kingdom, Brazil, and Australia (EY, 2017). The common products of Fintech that include e-wallet, crypto-currency, Peer-to-Peer (P2P) financing, crowd-funding, and Insurtech have become major financial alternatives for consumers and businesses (Capgemini, LinkedIn, & Efma, 2018; Jin, Seong, & Khin, 2019). As of May 2018, global investment in Fintech companies had hit US\$57.9 billion, and this number is expected to increase annually (KPMG, 2018).

In the context of Islamic finance, Fintech is believed to offer various advantages to the industry namely increased efficiency, reduced costs and a wider range of products (Bakar & Rosbi, 2018; PwC, 2016). Fintech can also attract more customers and help the Islamic finance industry become more competitive against its conventional counterpart (Reuters, 2018). According to EY (2017) and PwC (2016), out of the four financial sectors that are likely to be the most disrupted by Fintech over the next five years are consumer banking, fund and transfer payments, investment and wealth management, and also small and medium-sized enterprises' (SMEs) financing.

In Malaysia, the Islamic crowdfunding platforms known as Investment Account Platform (IAP) has been initiated with an aim to provide investors the opportunity to invest and share the profits from Shariah-compliant investment activities (Mohamed Asmy & Hassanudin, 2017). In addition, with the elements of crowd-funding and microfinancing, the introduction of the IAP enables SMEs to get their capital in a shorter time with more simple terms and conditions, and also with shorter loan periods (Reuters, 2014; SME, 2016a). However, despite various advantages the IAP may offer, almost 60 per cent of SMEs are not aware of the availability of Islamic business financing facilities and are also still adopting conventional financing (Zahid, 2018). According to SME (2016), there is an estimated financing gap of RM21.8 billion that can potentially be met by alternative financing, including the IAP. The gap could exist due to little understanding and awareness among the SMEs on the development of Fintech (Ghazali & Yasuoka, 2018). Therefore, before further efforts are taken to promote and expand the use of the IAP platform as an alternative financing for SMEs, it is essential to explore and identify what may actually drive the SMEs' intention to use the platform. Utilising the technology acceptance model, the central hypothesis for this paper is that the SMEs' intention to use the IAP is a result of perceived usefulness towards participation in the IAP. In this paper, subjective norm, experience, and voluntariness are integrated into the model.

The remainder of this chapter is organized as follows: literature review and hypothesis development were presented in the next section. Thereafter, the theoretical framework is presented. Subsequently, methodology section is presented which provide details of the procedure, sample, and measures of the empirical study, followed by the study's results. This paper concludes with a discussion of the implications of the findings and by offering directions for further research.

LITERATURE REVIEW

Small and Medium Enterprises (SMEs) in Malaysia

As with any other countries, Malaysia recognises the important role of SMEs as an economic agent. SMEs in Malaysia are governed by the SME Corporation of Malaysia. As of 2017, SMEs accounted for 98.5 per cent of the country's total registered companies and 65.3 per cent of the workforce in the private sector. SMEs are also the engine of economic growth, with the contribution of 36.6 per cent of country gross domestic product (GDP) as of December 2016. In addition to that, SMEs also contributed to the increasing employment rate in the country. In 2015, SME employment grew by 5.6 per cent to 6.6 million workers compared with the employment growth of large firms of 3.4 per cent. As a result of the higher employment growth of SMEs versus large firms, the percentage share of employment by SMEs to total employment increased from 57.5 per cent in 2013 to 65.5 per cent in 2015 (SME, 2016b). In terms of location, SMEs are mostly concentrated in Selangor (19.8 per cent) and Kuala Lumpur (14.7 per cent), followed by Johor (10.8 per cent) (SME Corporation, 2017a).

SMEs are divided into two broad industries: 1) manufacturing, 2) services and others. Companies in manufacturing with 5 to less than 75 employees and recorded sales turnover between RM300 thousand to less than RM15 million are considered as a small enterprise while companies with 75 to and less than 200 employees and sales turnover of 15 million to 50 million are considered as a medium enterprise. In services and other industries, companies with a number of employees between 5 to less than 30 with sales turnover between RM300 thousand to less than RM3 million are considered as a small enterprise, whereas companies with sales turnover between RM3 to less than RM20 million and from 30 to less than 75 employees are considered as a medium enterprise (Auzzir, Haigh, & Amaratunga, 2018; SME Corporation, 2016). Table 1 below shows the detailed definition of SMEs by category:

Table 1. Detailed definition of SMEs

Size	Small		Medium	
	Sales Turnover	Employees	Sales Turnover	Employees
Manufacturing	RM300,000 to less than 15 million	5 to less than 75 employees	RM15 million to less than 50 million	75 to less than 200 employees
Services & other	RM300,000 to less than 3 million	5 to less than 30 employees	RM3 million to less than 20 million	30 to less than 75 employees

Source: SME Corporation (2017b)

Malaysian government has placed a high priority to SME development. SME policy framework, future development plan and various initiatives have been introduced to bring the industry forward. Over the last decade, SME and entrepreneurship development have emerged as a national agenda following the setting up of the National SME Development Council (NSDC). Since its inception in 2004, NSDC has continued to steer SME development in Malaysia by setting the strategic direction and formulating policies to promote the growth of SMEs across all economic sectors. As the highest policy making body, the Council has been crucial in promoting a more holistic and coordinated approach in SME development. Various activities have been conducted by NSDC including developing SME database and statistics,

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monitoring and analysing SME performance to facilitate policy formulation, streamlining dissemination of information on SMEs, developing the SME financial infrastructure and endorsing the formulation of an SME Masterplan (SME, 2016b).

Financial Technology and Islamic Crowdfunding Platforms for SMEs

Financial technology (Fintech) is the latest technology and innovation that aims to contend the conventional financial approaches in the delivery of financial services. According to Kpmg (2018, pp.57), Fintech refers to “businesses that are using technology to operate outside of traditional financial services business models to change how financial services are offered”. In other words, Fintech applies the use of information technology with other financial services. The applicability of Fintech is able to improve the performance of financial services in the country (T. Lee & Kim, 2015). According to Lacasse et al. (2016), Hong Kong has the highest adoption rate of Fintech (29.1 per cent), followed by the United States (16.5 per cent), Singapore (14.7 per cent), the UK (14.3 per cent), Australia (13 per cent) and Canada (8.2 per cent). Other than that, Islamic Fintech is also growing steadily around the globe. Malaysia, Indonesia, the GCC, the US, the UK and Germany are among countries with growing Islamic Fintech (Maierbrugger, 2018).

Islamic crowdfunding is one of the elements in Islamic Fintech. According to Islamic Financial Services Board (2017), crowdfunding brings the Internet platform to the financial industry to connect fund seekers and fund providers (investors) without the intermediation of a bank. The main focus of crowdfunding is to gather funds from a crowd in order to finance a particular project or venture of SMEs (Alonso, 2015). There's two aspects that makes a crowdfunding platform Islamic; the compliance and the structure (Karim, 2016). In terms of compliance, Achsien and Purnamasari (2016) stated that the projects listed in Islamic crowdfunding must be invested in halal-related projects only and are free from *riba* (interest), *maysir* (gambling), and *gharar* (speculation). In addition to that, Wahjono et al. (2015), Achsien and Purnamasari (2016), and Saiti et al. (2018) indicated that several parties must be involved in the Islamic crowdfunding project including project initiator, potential funders, crowdfunding operator, trustee, and Shariah Supervisory Boards. In terms of structure, there are several Islamic based-crowdfunding structures that have been introduced in the market. For example, Saiti et al. (2018) presented the *salam*-based crowdfunding structure for financing agricultural activities. According to them, *salam*-based crowdfunding structure offers various advantages including risk sharing, possibility to generate a large sum of capital, higher dividends, and minimum regulatory requirements. Aqidah, Mohd, and Palil (2016) introduced *waqf*-based crowdfunding as a collaborative fundraising tool for Islamic crowdfunding. Earlier, Lutfi and Ismail (2016) presented the *sadaqah*-based crowdfunding model for entrepreneurs using the *qard al-hasan* contract. In addition to that, there are several other Islamic crowdfunding structures that have been initiated including *zakat*-based, *infaq-sadaqah-waqf*-based, *qard-al-hasan*-based, *syirkah*-based (*mudharabah* and *musyarakah*), and lending-based (*murabaha*, *ijarah*, and *istisna*) (Achsien & Purnamasari, 2016).

The Advantages and Challenges of Crowdfunding Financing for SMEs

Crowdfunding offers various advantages to SMEs. According to De Buysere et al. (2012), the main advantage of crowdfunding is that the investors, who invest a specific amount of money for a particular project, are also ambassadors of the project they support. It is good marketing for the SMEs as the inves-

tors are able to help in promoting the project to their own networks. Crowdfunding also offers flexibility in a way that it allows investors to join the business venture with just a minimum amount of investment (Bloomio, n.d.). With the help of crowdfunding, SMEs are no longer required to go through the hurdles of applying for traditional loan from banking institutions, which will subsequently reduce cost and time spent on these activities. Furthermore, this will reduce the funding gap for SMEs (Association of Southeast Asian Nations (ASEAN), 2017). In addition to that, the concept of crowdfunding, which allows investors to invest their money in the company of choice, is able to decrease the cost of product development and pre-marketing, while at the same time, generates revenue before production, and therefore provides SMEs with a positive cash flow prior to product launching (De Buysere et al., 2012).

While crowdfunding is rapidly bringing the physical and digital worlds closer, SMEs face several challenges and threats such as lack of information technology (IT) security and compatibility, inadequate infrastructure, expertise insufficiency, and unsupportive government regulations (ASEAN, 2017; Capgemini et al., 2018; KPMG, 2017; Padmanaban & Soo, 2016). According to the Association of Southeast Asian Nations (ASEAN) (2017), the gap between regulatory frameworks and the advancement of digital economy is one of the major challenges to be addressed, especially in ASEAN countries. Therefore, in order to further boost the SME industry, regulators and industry players need to work towards addressing the challenges.

Technology in Fintech

Fintech brings about a new paradigm in which information technology drives innovation in the financial industry. The enabler in Fintech development is the use of technology and infrastructure. According to Life.SREDA (2015), the application programming interface (API) technology has been extensively used by start-ups across the world. API is a critical technology that offers application integration between platforms, innovation as well as client connectivity. According to Hines (2018), API is the latest evolution in integration technologies, enabling fast performance, reliability, and reuse of components that can be frequently and easily managed and updated. With the use of API, Fintech start-ups are able to extend their business model with specific banking services such as credit, payments, cards, and escrow accounts. Other than API, several other technologies are also associated with Fintech. Among them are backend as a service (BaaS-platform), blockchain, augmented reality (AR), and artificial intelligence (AI).

BaaS-platform is an approach for providing web and mobile app developers with a way to connect their applications to backend cloud storage and processing (Lane, 2013). The advantages of BaaS-platform are that it is able to provide common features such as user management, push notifications, social networking integration, and other features that mobile users demand from their apps these days. With the present emergence of mobile apps, BaaS-platform is able to help Fintech start-ups to expand their business and market their service not only to the local market but to other countries as well. Blockchain is another technology in the Fintech wave. It is a distributed digital ledger that is capable of combining a number of mathematical, cryptographic, and economic principles in order to maintain a database while continuously recording and documenting every and each transaction that occurs across a peer-to-peer network (PricewaterhouseCoopers (PwC), 2016). In other words, blockchain is a shared list of continually updated transactions, which allows multiple participants to maintain a database without the need for third party validation or reconciliation (Padmanaban & Soo, 2016). The technology behind blockchain eliminates the validation and verification friction for transactions associated with a centralised system, allowing for a safer, simpler, and faster exchange of digitally represented assets. For Fintech start-ups,

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including SMEs, blockchain is expected to become the basis for smart contracts in a way that automated processes are enforced without human intervention.

Several other technologies such as AR and AI also play a big role in supporting Fintech start-ups. AR is a new technology that involves the overlay of computer graphics in the real world, whereas AI refers to the technology used by computer systems to perform tasks that traditionally require human intelligence (Financial Stability Board, 2017; Silva & Laboratório, 2003). The applicability of both of these technologies is able to transform Fintech start-ups to achieve the status quo.

Background of the Malaysia Context

Malaysia is a Southeast Asian country occupying parts of the Malay Peninsula and the island of Borneo, which comprises 13 states and 3 federal states. Since gaining its independence back in 1957, Malaysia has successfully diversified its economy from agriculture and commodity-based to manufacturing and services sectors. Gross domestic product of the country increased from 4.1 per cent in Q1 2016 to 5.4 per cent in Q1 2018, with private consumption remaining as the main contributor to growth (World Bank Group, 2018). Malaysia is categorised as one of the most open economies in the world and is on track to achieve its transition from an upper middle-income economy to a high-income economy. In year 2019, the government aims to have more stable employment and wage growth, conducive financing conditions and benign inflation to support private consumption, which was forecasted to expand by 6.8 per cent (PwC, 2019). In addition, to support responsible innovation and economic development in the financial sector, the Malaysian government has been supportive of technological innovation including accelerating Fintech growth (Capgemini et al., 2018; ICLG, 2018).

The Inside Story of Financial Technology in Malaysia

To accelerate the Fintech growth, several initiatives have been taken by the Securities Commission Malaysia or SCM (a statutory body entrusted with the responsibility of regulating and systematically developing the capital markets in Malaysia). SCM's responsibilities include facilitating peer-to-peer (P2P) lending, assisting equity crowdfunding, and launching digital-free trade zones to help local SMEs get into cross-border trade by leveraging on technology (International Comparative Legal Guides (ICLG), 2018). Furthermore, Malaysia also allows foreign Fintech companies, namely Alipay and Telenor, to set up partnerships in the country to facilitate onshore and cross-border payments (ICLG, 2018). In addition to that, earlier in October 2016, Bank Negara Malaysia, the Central Bank of Malaysia, has introduced a financial technology regulatory sandbox framework. The framework is presented with the aim of enabling the innovation of Fintech to be deployed and tested in the country in a live environment, within specified parameters and time frames (Central Bank of Malaysia, 2016). The sandbox framework received high attention from the financial institutions in Malaysia. Maybank, the largest bank in Malaysia with branches overseas, launched its Maybank sandbox in June 2017, offering its customers a real banking API to connect and make use of existing banking functions (ICLG, 2018). The efforts in accelerating Fintech do not stop there. In November 2018, SCM also approved the first robo-advisor for the Malaysian market. Named as ERAA (Economic Regime-based Asset Allocation), it is a digital investment manager that works based on data, which is able to imitate the work of human portfolio managers to plan investors' portfolio investments. The robo-advisor is able to reduce the costs of human labour while still offering personalised portfolios, and can usually be accessed as long as one has Internet connection

(Pikri, 2018). All the above initiatives have created awareness on the importance of Fintech for making business processes more efficient and effective.

Bank Negara Malaysia also ensure SMEs are not left behind and immerse in the advancement of fintech. In February 2016, an Islamic crowdfunding platform known as Investment Account Platform (IAP) has been initiated. The IAP formulate the efficiency of technology to channel funds from investors to viable economic ventures. The platform also targets ventures which include those from SMEs and others in innovative and new growth areas, and aims to provide investors the opportunity to invest in and shares the profits from Shariah-compliant investment activities (Mohamed Asmy & Hassanudin, 2017). With the assistance of crowd-funding and microfinancing elements, the introduction of the IAP enables SMEs to get their capital in a shorter time with more simple terms and conditions, and with shorter loan periods (Reuters, 2014; SME, 2016a). With a minimum requirement for fundraising of RM500,000, this initiative is expected to encourage the development of SMEs, which will, in the long run, positively affecting the economy (M. A. Aziz & Che Wan, 2016). In short, the establishment of IAP is to offer ventures including alternative ways for SMEs to get funding through a Fintech platform.

The Technology Acceptance Model

The technology acceptance model (TAM) developed by Fred Davis is one of the most important theories in the field of technology acceptance (Granic & Marangunic, 2015). TAM was adapted from two main theories in the field of psychology namely theory of reasoned action (TRA) and the theory of planned behaviour (TPB). Both of these theories link one's beliefs and behaviour. Specifically, TRA is a theory indicating both attitude and subjective norm will influence intention, which in turn influences behaviour (Ajzen & Fishbein, 1980). An additional variable known as perceived behavioural control has been introduced by Ajzen (1991) to the theory to account for behaviours that are not under complete control. Both of the theories has been widely applied in technology-related studies (Chu & Chen, 2016; Gamal Aboelmaged, 2010; Hassan, Iqbal, & Iqbal, 2018; Mishra, Akman, & Mishra, 2014; Moore & Benbasat, 1996; Yousafzai, Foxall, & Pallister, 2010). For example, Yousafzai et al. (2010) used TRA in predicting consumers' behaviour in the context of Internet banking while Chu & Chen (2016) investigated e-learning technology adoption by extending TPB with another variable. In addition to that, Gamal Aboelmaged (2010) utilised TPB to predict e-procurement adoption in the United Arab Emirates. In recent studies by Hassan et al. (2018), they examined the factors that affect the adoption of internet banking in Pakistan through the theoretical lenses of two theories including TAM and TPB.

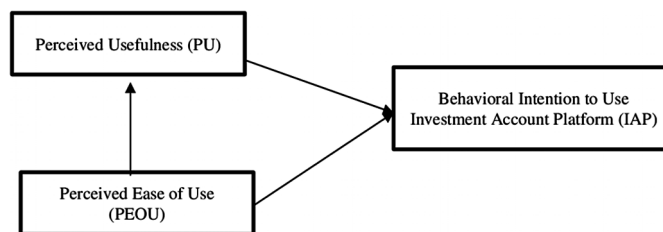
In order to develop a reliable model that could predict the actual use of any specific technology, Fred Davis adapted the TRA and TPB and proposed the TAM (Granic & Marangunic, 2015). Based on TAM, behaviour (actual technology use) is determined by one's intention, and the intention can be predicted by two primary determinants perceived usefulness (PU) and perceived ease of use (PEOU). While perceived usefulness is defined as the degree to which a person believes that using a particular system will enhance his or her job performance, perceived ease of use refers to the degree to which the person believes that using the system will be free of effort (Davis, 1989). Further, technology adoption intention refers the degree of willingness to use technology continuously (Davis, Bagozzi, & Warshaw, 1989). In the context of understanding technology-related behavior, TAM was found to be superior than TRA and TPB (Yousafzai et al., 2010) and the main reason it was adapted in this paper. The TAM is illustrated in Figure 1.

Adoption of Financial Technology in Islamic Crowd-Funding

Due to the applicability of TAM to predict technology acceptance's behaviour and its usefulness in identifying factors in determining behavioural intentions, this theory has been applied extensively in various research papers on intention-related research including on financial technology (Alaeddin & Altounjy, 2018; Cham, Low, Lim, Aye, & Raymond, 2018; S. Y. Lee & Park, 2016; Lou & Li, 2017; Mohamed Asmy & Hassanudin, 2017). For example, Alaeddin & Altounjy (2018) investigated the factors affecting Malaysian Generation Z's attitude and intention to use cryptocurrency in their financial decisions while Lee & Park (2016) explore the factors that affect the intention to use mobile payment services. In addition to that, Lou & Li (2017) explore the research and application landscape of blockchain technology acceptance. Using a comprehensive approach, they proposed that TAM is able to explain the adoption of blockchain technology. In the next section, each of the relationships between variables will be further discussed and hypothesis will be proposed.

Figure 1. The technology acceptance model

Source: Davis (1989)



Development of Research Hypotheses

The Relationship Between Perceived Usefulness and Investors' Intention

Davis (1989) defined perceived usefulness as the degree to which a person believes that using a particular system will enhance his or her job performance. This proposition is justified from the perspective that people's intentions to use the technology will be greater if they expect a technology to enhance their performance on the job. In the context of this paper, if SMEs believe that the use of IAP is able to increase their chance to get funding, they will be likely to use the platform. In short, perceived usefulness is about the effectiveness of the platform in helping SMEs to get their funding.

Literature provides a considerable amount of academic research examining the relationship of perceived usefulness and intention (Cham et al., 2018; Cho & Sagynov, 2015; Chu & Chen, 2016; Gamal Aboelmaged, 2010; Hamid, Razak, Bakar, & Abdullah, 2016; M. C. Lee, 2009). In the context of new Fintech, Kim & Kim (2018), S. Lee (2016), and Mohamed Asmy & Hassanudin (2017) found the significant relationship between perceived usefulness and intention. Based on the above, this paper hypothesised the following:

Hypothesis One: Perceived usefulness has a significant positive effect on investors' intention to use the investment account platform.

The Relationship Between Perceived Ease of Use and Investors' Intention

Perceived ease of use refers to the degree to which the person believes that using the system will be free of effort (Davis, 1989). In the context of this paper, it refers to the extent to which users believe that the use of IAP is free of effort. According to Hamid et al., (2016), if a system is relatively easy to be used, individuals will be more willing to learn about its features and finally intend to use it. In other words, if SMEs believes that the IAP is relatively easy to be used, they will be likely to use the platform.

Many existing studies have assessed the relationship between perceived ease of use and its influences on the intention to use technology (Cho & Sagynov, 2015; Chu & Chen, 2016; Hamid et al., 2016; Tanduklangi, 2017). For example, Hamid et al. (2016) investigated and found that perceived ease of use was positively related to continuance intention to use e-government. In addition to that, many has uncovered that perceived ease of use affected intention in the context of new Fintech (Kim & Kim, 2018; S. Lee, 2016; Mohamed Asmy & Hassanudin, 2017). For instance, Kim & Kim (2018) investigate consumers' continuous intention to use one of the most commonly used Fintech, the mobile ease payment services. They found that perceived ease of use has a positive effect on continuous use intention in adopting the new technology. Consequently, this paper proposes the following hypothesis:

Hypothesis Two: Perceived ease of use has a significant positive effect on investors' intention to use the investment account platform.

The Relationship Between Perceived Ease of Use and Perceived Usefulness

TAM suggests that perceived ease of use influences the perceived usefulness of the technology. To explain further, the easier it is to use a technology, the greater the expected benefits from the technology. With regards to IAP, perceived ease of use can impact its usefulness to the extent that the platform must be easy to use for SMEs and thus realise its' usefulness.

Studies indicate that perceived ease of use is associated with perceived usefulness in the context of technology adoption (Cho & Sagynov, 2015; Chu & Chen, 2016; Gamal Aboelmaged, 2010; McCloskey, 2011; Tanduklangi, 2017). To illustrate, Gamal Aboelmaged (2010) predicted e-procurement adoption and measured the relationship between perceived ease of use and perceived usefulness. He found out that these two constructs have a strong relationship. In addition to that, in the online environment, Cho & Sagynov (2015) also found a significant relationship between perceived ease of use and perceived usefulness. Based on the above, this paper hypothesised the following:

Hypothesis Three: Perceived ease of use has a significant positive effect on perceived usefulness of investment account platform among investors.

The Mediating Role of Perceived Usefulness

One of the main advantages of the crowdfunding platform is that it offers speed and accessibility. Compared to conventional financing that requires more time in applying for a loan or seeking out accredited investors by themselves, listing up the businesses in the crowdfunding platform is far easier, efficient and effective in promoting the businesses out to the investor (Bakar & Rosbi, 2018; PwC, 2016). With regards to the crowdfunding platform, if the platform is relatively easy to be used, the businesses will

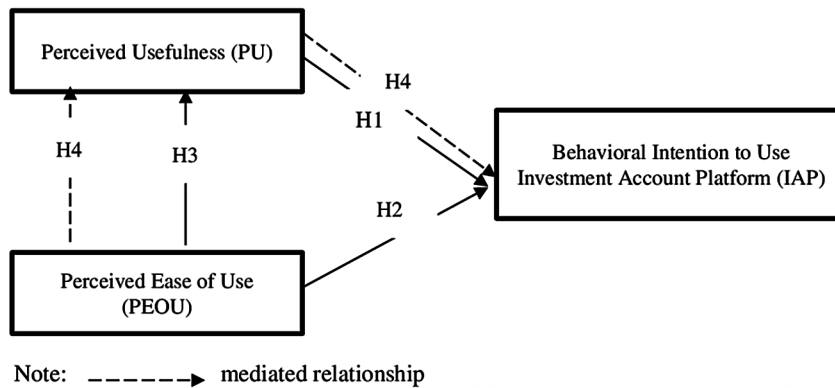
have an enjoyable experience seeking for a fund and thus will improve the perceived usefulness of the platform and facilitate the intention to use. In other words, having a good perception of a crowdfunding platform as a useful tool to find the investor may lead the SMEs towards using the platform. Hence, the higher the perceived ease of use, the greater the intention to use the platform, who will perceive higher usefulness when using the platform. In sum, if the SMEs think that using the platform is easy, their intention of use the platform will increase. Several studies have considered perceived usefulness as a mediator for intention (Matute, Polo-Redondo, & Ana Utrillas, 2016; Moslehpour, 2018). Based on these arguments, this paper proposed the following hypothesis:

Hypothesis Four: The relationship between perceived ease of use and intention is mediated by perceived usefulness of the investment account platform

THEORETICAL FRAMEWORK

The proposed relationships between the variables are illustrated in Figure 2.

Figure 2. The theoretical framework



METHODOLOGY

Primary data in the form of questionnaire were collected from 163 SME owners in Kuala Lumpur, Malaysia using the purposive sampling technique. A self-administered questionnaire was developed to measure the research variables and to collect demographic information. The questionnaire consisted of two sections. Section A contained questions pertaining to the respondents' demographic information namely age, business type, and financial information on the SMEs. Section B consisted of a five-point Likert scale measurement questions ranging from strongly disagree (1) to strongly agree (5) to measure the variables. The measurement of each construct was adapted from Davis (1989) and SME (2016). Table 2 shows the items used in the questionnaire.

The hypotheses were tested by applying structural equation modeling. Statistical Package for the Social Sciences (SPSS) and partial least squares – structural equation modeling (PLS-SEM) via Smart-PLS were used to examine the hypothesised relationships among the proposed variables. According to Rasoolimanesh & Ali (2018), partial least squares have less restrictions about sample size and construct measurement, as well as its capability in handling both formative and reflective measurement models. PLS-SEM has been utilised extensively in technology adoption-related research (Alaeddin & Altounjy, 2018; Hassan et al., 2018; Kassim & Ramayah, 2015).

Table 2. Items used in the questionnaire

Variable	Item	Question	Source
Perceived Usefulness (PU)	PU1	Using the IAP would save my time in looking for financing.	(Davis, 1989)
	PU2	Using the IAP allows me to seek financing more quickly and efficiently	
	PU3	The IAP allows me to track the amount of financing subscribed for my enterprise	
	PU4	The IAP enhances the effectiveness in looking for financing	
	PU5	The IAP makes it easier to search for and seek for financing	
	PU6	I would find the IAP to be useful in applying for financing.	
Perceived Ease of Use (PEOU)	PEOU1	Learning to use the IAP was easy for me.	(Davis, 1989)
	PEOU2	Using the IAP was clear and understandable.	
	PEOU3	I found it easy to get the IAP to apply for financing for my enterprise.	
	PEOU4	It is easy for me to remember how to perform tasks using the IAP	
	PEOU5	The IAP is flexible to use	
	PEOU6	Overall, I think the IAP is easy to use	
Intention (INT)	INT1	I intend to use the IAP in the near future	(S. Aziz, Md Husin, Hussin, & Afaq, 2019)
	INT2	I am likely to participate the IAP in future	
	INT3	I plan to use the IAP in the next months	
	INT4	I predict I would use the IAP in the next months.	

FINDINGS

Characteristics of the Sample

SMEs from the manufacturing industry were made up of 45.4 per cent of the sample while the remaining 54.6 per cent were from services and other industries. As for the entire sample, 36.2 per cent of the sample are from small companies and 63.8 percent from medium companies. About 7.36 per cent of the businesses obtained funding from individual investors and family offices, 12.88 per cent funded by insurance companies, 15.95 per cent funded by pension and provident funds, 15.34 per cent funded by funds and other asset managers, 24.54 per cent funded by corporate investors, 12.88 per cent funded by government agencies, 7.98 per cent funded by sovereign wealth funds and government investment companies and the remaining 3.07 per cent from other sources of fund.

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Table 3. Overall profile of respondents

Variable	Frequency	Percentage
<i>Industry</i>		
Manufacturing industry	74	45.40
Services and others industry	89	54.60
<i>Type of enterprise</i>		
Small	59	36.20
Medium	104	63.80
<i>Financial source of business fund</i>		
Individual investors and family offices	12	7.36
Insurance companies	21	12.88
Pension and provident funds	26	15.95
Fund of funds and other asset managers	25	15.34
Corporate investors	40	24.54
Government agencies	21	12.88
Sovereign wealth funds and government investment companies	13	7.98
Others	5	3.07

Reliability Analysis

Assessment of measurement model includes convergent validity (loading), average variance extracted (AVE), composite reliability and discriminant validity. All assessments are confirmed by the PLS algorithm. All factor loadings exceeded the recommended 0.7 threshold except for an item (PEOU6) (see Table 4). However, this paper kept both items in the model since Bagozzi & Yi (1988) suggest that factor loading greater than 0.60 is acceptable in an exploratory research. Discriminant validity was assessed using the Fornell-Larcker criterion and heterotrait-monotrait ratio of correlations (HTMT). In Fornell & Larcker (1981)(Fornell & Larcker, 1981)(Fornell & Larcker, 1981)(Fornell & Larcker, 1981)(Fornell & Larcker, 1981)(Fornell & Larcker, 1981)(Fornell & Larcker, 1981)(Fornell & Larcker, 1981)(Fornell & Larcker, 1981)(Fornell & Larcker, 1981) criterion, the root square of AVE and all inter-construct correlations were compared while in HTMT, the mean value of the item correlations across constructs relative to the (geometric) mean of the average correlations for the items measuring the same construct was measured (Joe F Hair, Risher, Sarstedt, & Ringle, 2018). According to Fornell & Larcker (1981), to pass the discriminant validity assessment, each construct's AVE should be higher than its squared correlation with any other constructs while Henseler, Ringle, & Sarstedt (2015) suggest that to clearly discriminate between two constructs, the HTMT should be significantly smaller than one. In this paper, both Fornell-Larcker criterion and HTMT were met and thus confirming that the discriminant validity is not a problem (see Table 5 and Table 6).

Table 4. Factor loadings and reliability

Construct	Item	Loadings	AVE	CR	RHO
Intention (INT)	INT1	0.862	0.768	0.930	0.904
	INT2	0.854			
	INT3	0.899			
	INT4	0.890			
Perceived ease of use (PEOU)	PEOU1	0.774	0.599	0.899	0.876
	PEOU2	0.827			
	PEOU3	0.817			
	PEOU4	0.820			
	PEOU5	0.764			
	PEOU6	0.624			
Perceived usefulness (PU)	PU1	0.732	0.612	0.904	0.879
	PU2	0.840			
	PU3	0.817			
	PU4	0.836			
	PU5	0.701			
	PU6	0.757			

Table 5. Fornell-larcker criterion

Construct	Intention	Perceived Ease of Use	Perceived Usefulness
Intention	0.876**		
Perceived ease of use	0.681*	0.774**	
Perceived usefulness	0.429*	0.531*	0.782**

Notes: Main diagonal** elements are the square root of the AVE for each reflective construct. Off-diagonal* elements are the correlations between constructs

Table 6. Heterotrait-monotrait ratio (HTMT)

Construct	Intention	Perceived Ease of Use	Perceived Usefulness
Intention			
Perceived ease of use	0.765		
Perceived usefulness	0.468	0.580	

Model Evaluation, Path Analysis and Hypothesis Testing

Predictive power of the model is determined using the R-square (R²) and (Q²) value. According to Chin (1998) R² values of 0.67, 0.33, or 0.19 for endogenous latent variables in the inner path model are described as substantial, moderate, or weak. As shown in Table 7, R² for intention to use IAP was 0.472 indicating that 47.2 per cent of the variation in intention may be explained by perceived usefulness and perceived ease of use. In addition to that, R² for perceived usefulness was 0.236 indicating that only 23.6 per cent of the variation in perceived usefulness can be explained by perceived ease of use. This suggests that the model has a moderate explanatory power. Furthermore, blind-folding technique was used to assess the predictive relevance of the model. According to Joseph F. Hair, Hult, Ringle, &

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Table 7. Predictive relevance

Construct	R ²	Q ²
Intention	0.472	0.322
Perceived usefulness	0.236	0.149

Sarstedt (2017), Q² values larger than zero are recommended as they showed that the path model exhibits predictive relevance. As seen in Table 7, Q² value for intention was 0.322 while Q² value for perceived usefulness was 0.149.

Effect size (f²) is another criterion used to examine the unique effect of each independent variable on the dependent variable. According to Cohen (1988), f² values of 0.02, 0.15 and 0.35 are classified as small, medium and large, respectively. In this paper, the effect sizes (f²) of perceived usefulness and intention was 0.016 (small), while for perceived ease of use and intention was 0.547 (large). The perceived ease of use and perceived usefulness also had large effect (0.357). Hence, it is concluded that the research model has an adequate predictive relevance.

H1 and H2 examined the influence of perceived usefulness and perceived ease of use on intention to use IAP, respectively. H3 examined the influence of perceived ease of use on perceived usefulness while H4 examined the role of perceived usefulness as a mediator on the relationship between perceived ease of use and intention. Three (H2, H3 and H4) hypotheses were statistically significant. More specifically, perceived ease of use towards intention ($\beta = 0.626$, $p < 0.001$), perceived ease of use towards perceived usefulness ($\beta = 0.513$, $p < 0.001$) and mediating role of perceived usefulness on the relationship between perceived ease of use and intention ($\beta = 0.058$, $p < 0.10$) to use IAP were statistically significant. Table 8 shows the results of hypothesis testing while Figure 3 shows the results of the PLS analysis.

Table 8. Results of hypothesis testing

Hypothesis	Relationship	Standard Beta (β)	Standard Error	t-Value	Results	f ²
H1	PU → INT	0.108	0.072	1.503	Not significant	0.016
H2	PEOU → INT	0.626	0.076	8.218**	Significant	0.547
H3	PEOU → PU	0.513	0.062	8.252**	Significant	0.357
H4	PEOU → PU → INT	0.058	0.039	1.426	Significant	---

* statistically significant as at $p < 0.05$ ($t > 1.96$)

** statistically significant as $p < 0.001$ ($t > 3.29$)

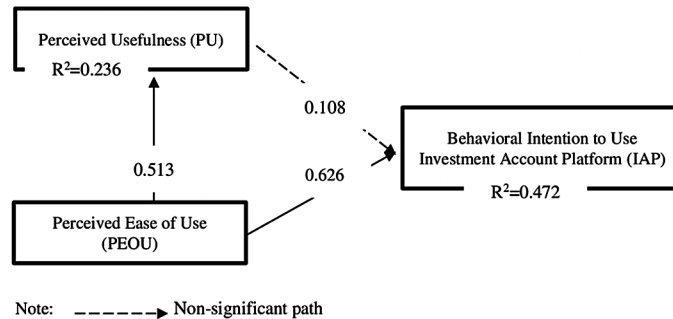
***statistically significant as $p < 0.01$ ($t > 2.576$)

Model Fit

Model fit was assessed using Goodness of fit (GoF) index. GoF has been developed by (Tenenhaus, Vinzi, Chatelin, & Lauro (2005) to assess the overall measure of model fit for PLS-SEM. The GoF is computed as the geometric mean of the average communality index and the average R² value (Tenenhaus, Amato, & Esposito Vinzi, 2004). The GoF index is bound between 0 and 1, whereby the model with a higher

fit is the better or more valid model. As a benchmark, Akter, D'Ambra, & Ray (2011) mentioned that the GoF value of 0.10 is considered as small while GoF value of 0.25 and 0.36 is considered as medium and large, respectively. In this paper, the model generated GoF value of 0.48, which indicates that the model has a better prediction power in comparison with the baseline values (GoF criteria).

Figure 3. Results of the PLS analysis



Importance Performance Map Analysis

The importance of performance map analysis shows perceived ease of use emerged as the most importance factor in determining intention to use IAP. The construct also performed better in the given model. Perceived usefulness was found to be less important and also less in terms of performance within the model. Figure 4 shows the IMPA results.

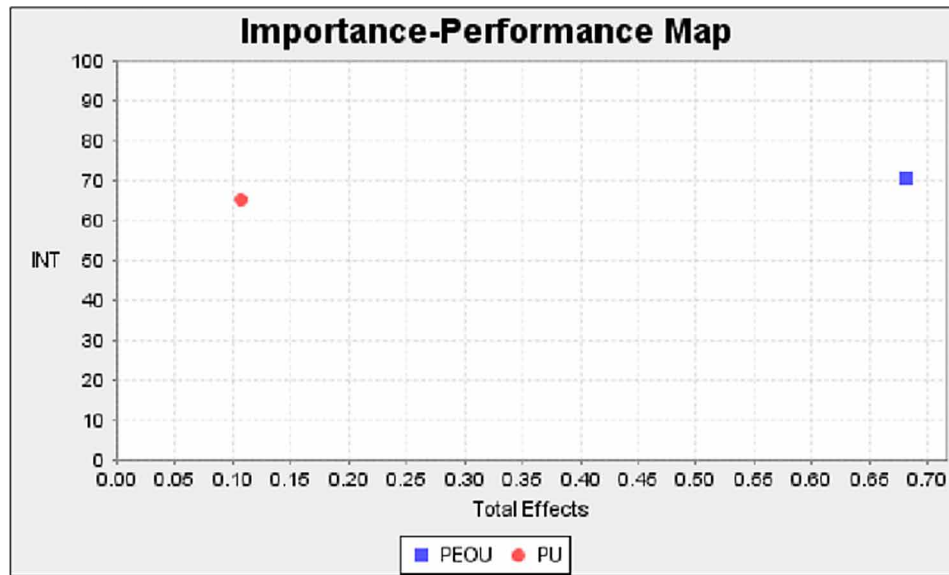
Table 9. Goodness of fit (GoF) index

Constructs	Average Variance Extracted (AVE)	R ²
Intention	0.768	0.472
Perceived ease of use	0.599	
Perceived usefulness	0.612	0.236
Average score	0.66	0.35
Average x R ²	0.23	
GoF = (AVE x R ²) ^{1/2}	0.48	

DISCUSSION

Based on the findings, three hypotheses were supported while one hypothesis was not supported. Perceived ease of use was found to have a significant impact on SME's intention to use IAP. The result indicated that the higher number of users believe that the use of IAP is free of effort, the higher their intention to use the platform. In other words, the easier for them to use the platform, the higher intention of users (SMEs) to use the platform. Therefore, in order to attract SMEs to use the platform as an alternative

Figure 4. IMPA results



channel to get funding, the policy maker needs to ensure the platform is easy-to-use. User's training and system manual should be provided to the user's and potential users. The significant relationship between perceived ease of use and intention has also been found in previous studies (Cho & Sagynov, 2015; Kim & Kim, 2018; Mohamed Asmy & Hassanudin, 2017; Tanduklangi, 2017).

This paper also found a significant relationship between perceived ease of use and perceived usefulness. The results suggest that users are likely to perceive the platform as useful when they believe that their platform is easy to use. The result is consistent with Tanduklangi (2017), McCloskey (2011) and M. C. Lee (2009). This result implies that when users think that using the platform is easy, they tend to believe that the platform is useful in facilitating them to seek for funding. This paper also found the mediating role of perceived usefulness on the relationship between perceived ease of use and intention. Obviously, the influence of intention to use IAP is strongly mediated by the practicality of the platform. Therefore, practitioners should focus on promoting the the practicality of the platform to SMEs that would lead them to use the platform. Practitioners may organise workshops and use the power of media in delivering the benefits of using the platform.

According to the original TAM, perceived usefulness is hypothesised to affect intention to use. However, this paper found the contrary. Perceived usefulness is found to have insignificant effects on intention. Although the insignificant effect of perceived usefulness is unexpected, it shows the same pattern as shown in several prior TAM research (Park, 2009). In sum, usefulness of the platform could not directly affect the user's intention to use e-learning. In a study by Park (2009), perceived usefulness affected users' attitude towards the use of technology and their attitudes affected their intentions to use. Future studies could incorporate the construct. This paper has theoretical and practical implications, which are discussed in the implication section.

CONCLUSION

The purpose of this paper is to examine the factors that influence Small and Medium-Sized Enterprises' (SMEs) intention to use the Investment Account Platform (IAP). Using Technology Acceptance Model (TAM), four hypotheses were developed where three were supported. In brief, the paper found that perceived ease of use has a significant relationship towards intention, while perceived ease of use has a significant relationship towards perceived usefulness and perceived usefulness mediates the relationship between perceived ease of use and intention to use investment account platform. The results of this paper highlight the applicability of TAM into Islamic finance-fintech research. The value of this paper lies in its presentation of a model for factors that affect SMEs' intention to use the IAP.

Theoretical and Practical Implication

This paper will be useful to researchers and professionals, including policy makers. Practically, this paper guides the strategic decision-makers of the banking industry especially in Malaysia to develop strategies that will help to increase the intention to use IAP in Malaysia. To attract SMEs to use the platform, policy makers need to ensure that the platform is convenient to be used in a way that the user is able to achieve the objective to use the platform with effectiveness, efficiency, and satisfaction. In other words, the platform should be easy to use by the SMEs. Few key features could be considered simplicity, functional yet reliable.

This paper also contributes to the body of knowledge. First, this paper provided insight into the effect of perceived ease of use and perceived usefulness in explaining SME's intention to use IAP, the crowdfunding platform based in Malaysia. Using TAM, this paper also investigates the mediating role of perceived usefulness on the relationship between perceived ease of use and intention. Previous studies have yet to utilise TAM in investigating intention to use IAP from the fund seeker perspective.

By bringing the theory from another perspective, this paper is not only helping policy makers in the development of better crowdfunding platform, but also provides a new insight into how to foster the platform to such users.

LIMITATIONS AND FUTURE RESEARCH

This paper has several limitations. First, it focused only on SMEs' intention to use the IAP; as a result, therefore, it cannot be generalised to other fintech-related platform. Thus, there is a need to commence further studies in other fintech-related settings, such as blockchain and other crowdfunding platforms. Second, this paper only considered two factors that influence the intention, and the factors selected may not include all other factors that could influence SMEs' intention to use the IAP in Malaysia. Hence, further research could take into account other relevant factors. Future research should include the measure of actual behaviour and explore the decomposition of perceived ease of use and perceived usefulness so that more in-depth insights could be obtained. Third, the insignificant relationship between perceived usefulness and intention is worth investigated in future research.

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KEY TERMS AND DEFINITIONS

Adoption: Readiness to perform a given behavior.

Crowd-Funding: The practice of funding a project or venture by raising small amounts of money from a large number of people, typically via the internet.

FinTech: The new technology and innovation that aims to compete with traditional financial methods in the delivery of financial services.

Small and Medium Enterprises: Businesses whose personnel numbers and profits fall below certain limits.

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Chapter 14

Financial Technology Implications: Emerging Markets Context

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ABSTRACT

The chapter examines the particularities of the financial technology industry and explores how FinTech is defined and how the financial technology solutions can be implemented by companies and categorized. Financial technology companies are generally start-ups founded with the purpose of disrupting financial systems and corporations that rely less on software. But Fintech is not confined to start-ups only. Fintech comprises a vessel of technical aspects that describes an emerging financial services sector in the 21st century. The chapter aims to provide key insights into the evolution of the FinTech sector in emerging markets like ASEAN and India by and industry experience in this area. Both industry survey reports and peer-reviewed research is used as secondary data. The critical challenges to be addressed at the policy level, regional differences and future implications are being discussed thereby creating bridges the FinTech in ASEAN context to create a coherent framework.

INTRODUCTION

Financial technology (or FinTech) is the new technology and innovation that aims to compete with traditional financial methods in the delivery of financial services. The use of smartphones for mobile banking and investing services are examples of technologies aiming to make financial services more accessible

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to the general public. FinTech is blurring lines between technology and financial services. It is a rapidly evolving segment of the financial services sector where tech-focused start-ups and other new market participants are disrupting how the financial services industry traditionally operates (Gabor and Brooks, 2017). New FinTech companies and market activity are reconstituting the competitive landscape, changing the definition of a player in the financial services sector. Financial technology (FinTech) has appeared as a relatively new industry in India. It has companies that use technology to offer financial services. These companies operate in insurance, asset management and payment etc. India has experienced the emergence of numerous FinTech start-ups, accelerators and incubators over the last few years. India is doing everything to establish itself as a global FinTech hub. With a large market of unserved customers, increasing mobile/internet banking, favorable demographics, an active start-up ecosystem and a large talent pool, ASEAN & India has strong opportunity (Hoontrakul, 2018).

One of definition of FinTech is “*the new applications, processes, products, or business models in the financial services industry, composed of one or more and provided as an end-to-end process through the Internet and used to computerize insurance, trading, and risk management*”. Also, Bitcoins’ and blockchain are the new internet technology with the potential to transform the financial industry and disrupt markets around the world. The online banking system that is internet banking will typically be part of the system operated by a bank and is in contrast to

The objectives of this chapter are summarized as:

Objective 1: What major factors that favor the financial technology in emerging markets?

Objective 2: How does trend for FinTech usage vary across different sectors and verticals?

Objective 3: What is scenario about conditions of FinTech sector in India?

Objective 4: Why does FinTech hold challenges as well as potential for ASEAN?

To answer these questions the study adopts mixed methods of research. Specifically, secondary data from research publications in peer-reviewed and indexed journals, industry white reports and other recent sources are being used. The unique contribution of study is it bridges the current research challenges in FinTech in ASEAN as well as Indian context to create a coherent framework to be empirical tested. Survey reports includes EY FinTech that uses EY Consumer Banking survey results (55,000 consumers surveyed worldwide which showed decreased dependence on their traditional bank and increased excitement about alternatives). Second industry report by Economist derives data from September and October 2018 survey of 25 executives to assess corporate attitudes towards FinTech in ASEAN, all of whom had an interest in operating in the region. Nearly half (44%) of survey respondents are already doing business in ASEAN, while other half (52%) are watching to enter in the next three years.

Background of ASEAN

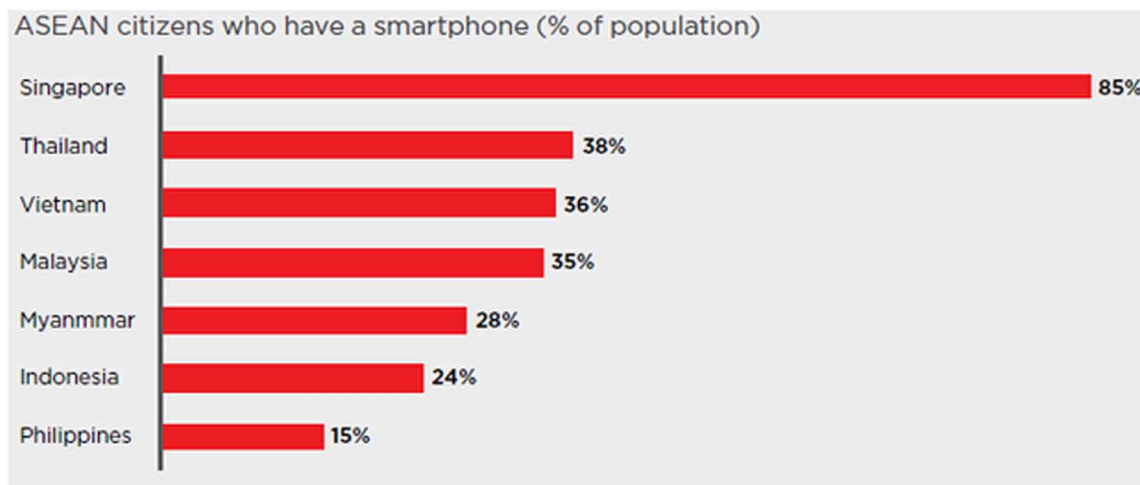
With more than 600m people, ASEAN is regarded as a development opportunity for businesses, given the large prospective customer base. This is particularly pertinent for companies generally, and technologically enabled ones specifically, looking at a comparative advantage in terms of digital skills vis-à-vis most countries in the region. Regardless of their home of operations, FinTech companies across the world are interested in tapping into the growing ASEAN market. Average incomes are growing and societies are gradually getting online, comprising via smartphones, which enable the distribution of new products or services to a growing population across the region.

Financial Technology Implications

This chapter shows important changes between the seven key markets within ASEAN, across areas such as technological readiness, business culture and regulation. Successful FinTech entrepreneurs approach the several markets within ASEAN with an appreciation of their distinct characteristics, opportunities and challenges. Among the seven ASEAN countries, Singapore leads across most areas of measurement undertaken (Gnirck and Visser, 2016). Its smartphone diffusion is more than twice that of Thailand, and the average income is also much greater than its other ASEAN neighbors. It is therefore not unexpected that the city state is also home to four in ten of the region's FinTech's, more than any other country.

Nimtrakoon (2015) found that investors attracted in the firms operating in ASEAN countries, must to develop their vision and concern about the priority of using Intellectual Capital (IC) to choose their portfolio by looking at the value creation ability and IC of various firms. Additionally, firms in each country tend to place a different degree of emphasis on components of value added intellectual coefficient to generate corporate value. The results showed that a positive relationship amongst IC and market value, endorsing that firms with greater IC tend to have greater market value. Similarly, a positive association existed between IC and financial performance measures.

Figure 1. ASEAN citizens who have a smartphone (% of population)



ASEAN embodies the aspiration of 10 uniquely different countries in Asia to bring about greater economic prosperity, and social and cultural progress for the people of ASEAN (Figure1). To achieve the 2025 ASEAN Economic Community (AEC) plan for regional economic integration, three strategic measures stand out as critical for the continued development of FinTech in the region:

1. Expand broadband access to more people and businesses to help bridge the digital divide between rural and urban areas.
2. Create a unified payment infrastructure to support mobile financial services, reducing the costs and complexities of cross-border payments and promoting financial inclusion.
3. Harmonise government policies and coordinate legal and regulatory frameworks in the areas of digital identity, privacy, trade and e-commerce.

Funding is powering the rise of FinTech in ASEAN as an engine of economic growth and prosperity has caught the eye of global investors and there is an abundant supply of early-stage funding in the area. Investment in Southeast Asia FinTechs soared 33 per cent year-on-year to US\$252 million in 2016, according to Tracxn. Total investment in the region is poised to exceed US\$338 million. Outside the traditional forms of backing from angel investors and venture capitalists (VCs), crowdfunding, venture debt and bank venture funds have also donated to the rise of fund available for capitalizing in ASEAN FinTechs.

While FinTechs are still in their initial stage in ASEAN, digital platforms such as e-commerce have thrived, backed by internet giants who have the financial power to make large, billion dollar investments in the next unicorns of ASEAN. The battle for the consumer wallet and mindshare continue to drive investment as internet giants seek to create a foothold in ASEAN, starting in Singapore, Indonesia and Thailand. The global FinTech industry attracted more than US\$24 billion in investment in 2016, ten times the level received in 2010 (Figure 2). FinTech investment in Asia exceeded North America for the first time in 2016, led by blockbuster deals in China, including Alipay and Lu.com raising US\$4.5 billion and US\$1.2 billion respectively(Figure 3).

Figure 2. Global FinTech investment activity

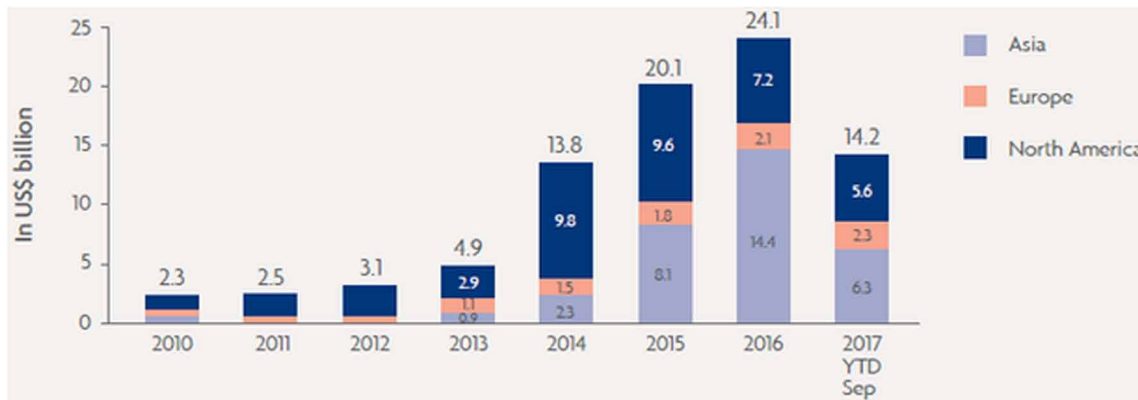
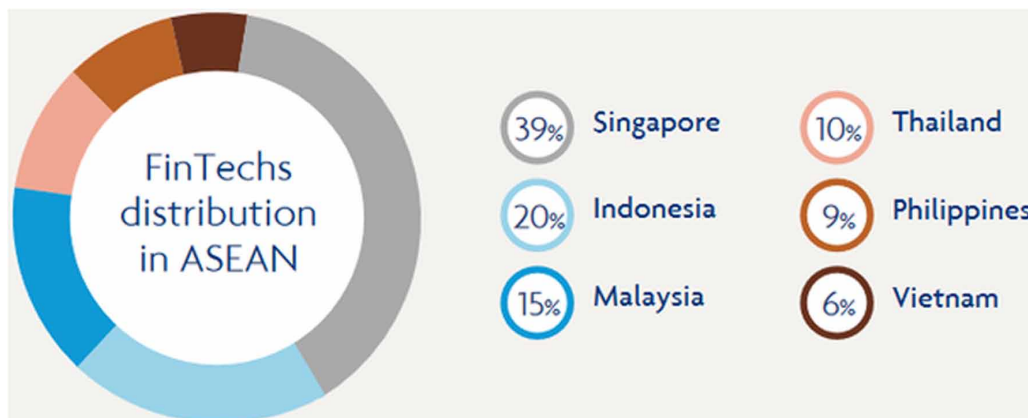


Figure 3. FinTech distribution in ASEAN



Financial Technology Implications

Indonesia, Malaysia and Thailand are fast catching up with Singapore as a favored FinTech home, supported by high levels of mobile adoption, rising rates of internet penetration and an progressively urban, literate and young population. This has attracted large numbers of investors and FinTechs to focus their attention on the region.

ASEAN also is observing evident progress in FinTech. In 2016, investments in the Southeast Asian FinTech market increased to US\$252 million, compared with US\$190 million in 2015, a rise of about 33 per cent. Total investment up to September 2017 has already exceeded that of 2016 to reach US\$338 million (Fig. 4). Most of the funding in the region is from seed and angel investors.

Figure 4. FinTech funding in ASEAN

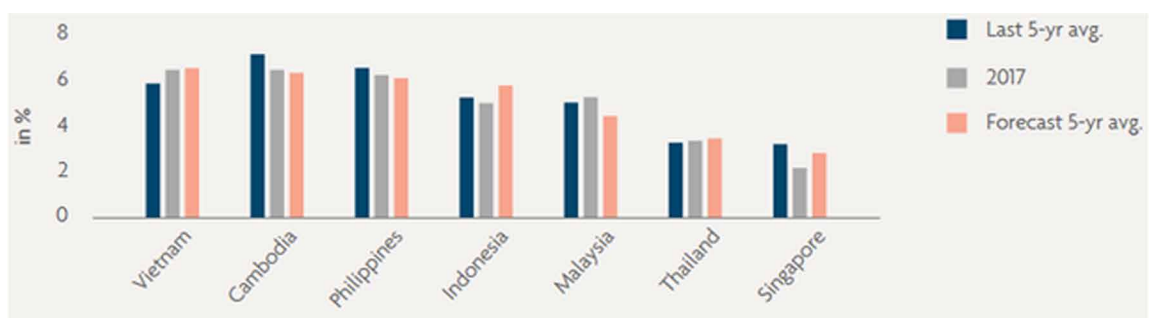


DRIVERS OF FINTECH

Robust Macroeconomic Growth

Robust GDP growth, favorable demographics, digital readiness and regulatory initiatives offer a plethora of prospects for FinTechs across the ASEAN region. Better cross-border interoperability and policy regulation will also help ASEAN to exploit the full benefits of digital technology (Figure 5).

Figure 5. Real GDP average growth (%)



Macroeconomic Growth Trend

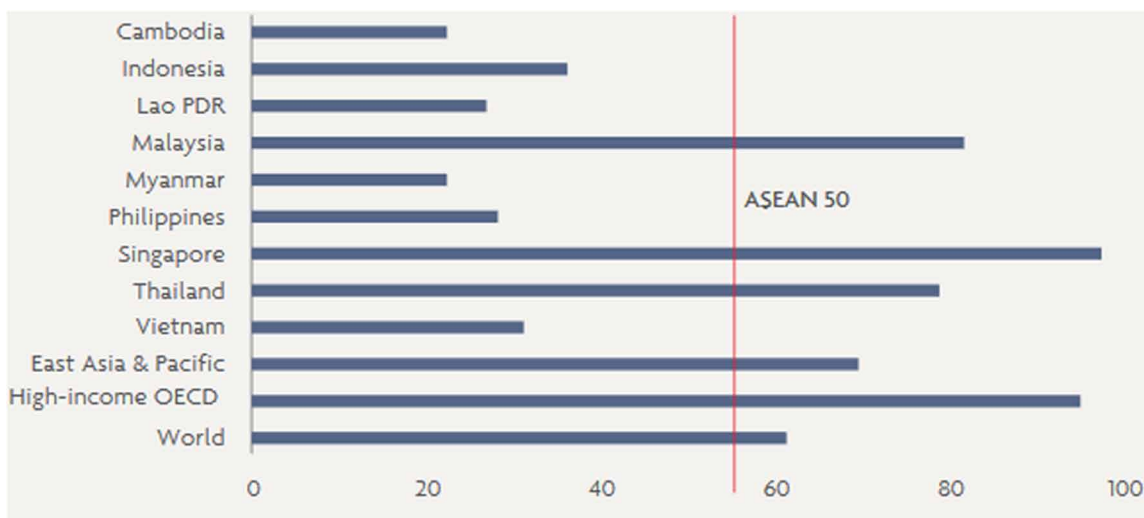
Around 50 per cent of ASEAN’s population is below 30 years of age. By 2030, this huge young population will enjoy bigger levels of literacy and contain many first-time career seekers. Southeast Asia’s urban population is also likely to rise by an estimated 100 million, to 373 million people by 2030. Overall, the forthcoming prospects of the ASEAN economies are optimistic, with Business Monitor International forecasting average real GDP growth of six per cent or higher in the emerging economies of Cambodia, Indonesia, the Philippines and Vietnam. The low government debt will also provide a fiscal cushion to ASEAN economies when compared with developed economies (Fig.5). Above average economic growth, together with a young, digitally-savvy population will help to stimulate middle-class expenditure which in turn will drive demand for financial services.

Low Banking Penetration

The ASEAN Economic Community’s Vision for 2025 is focused on closing the digital gap, improving financial access and literacy, escalating the scope of intermediary facilities (such as digital payments) and developing financial services for smaller firms and lower income groups. It supports information and communication innovation and technological developments such as big data and data analytics.

As at 2014, more than half of the adult population of ASEAN does not have access to banking services, which means more than 264 million adults in Southeast Asia are unbanked. The gap widens in rural areas, where 74 per cent of the population does not have access to a bank account (Figure 6). Key barriers to financial inclusion include the lack of personal documents and credit history, poor financial infrastructure, logistical and delivery challenges, restrictive regulations and financial products offered by banks in major cities that are more suited for an urban population. The large unbanked/underbanked population of ASEAN makes it an attractive region for FinTech companies to develop solutions and to go to market.

Figure 6. Adults with an account (2014) (%)



Digital Adoption

With the exception of Singapore, ASEAN countries are in the early stages of their digital journey. The fraction of internet users varies, with Singapore, Malaysia and Philippines having penetration levels of above 50 per cent, but in Indonesia the number is only 25.4 per cent (Kartawijaya, R., & Hamsal, 2018). Nevertheless, the region ranks third globally in terms of the number of mobile users, behind only China and India.

ASEAN ranks fourth globally in terms of the number of internet users, behind China, India and the US. Estimates show that combined, Indonesia, Malaysia, Philippines, Singapore, Thailand and Vietnam represent the world's fastest growing internet market (~14 per cent five-year compound annual growth rate (CAGR)) with an current internet user base of 315 million prediction to grow to around 480 million by 2020.

Mobile access in these countries is high, even in comparison with the developed markets of the United Kingdom and the United States. Digital research firm GfK estimates that in 2016, around 90 per cent of online consumers access the internet daily via their smartphones. Low access to the formal financial sector but high and increasing mobile and internet penetration offers a huge opportunity for FinTech companies in the region to bid financial services to traditionally underserved segments. As a result, the e-commerce market is expected to be worth around US\$88 billion by 2025. However, apart from Singapore and Malaysia, many of the ASEAN countries rank quite low in the Network Readiness Index (Singapore at #1 and Malaysia at #31, with the rest of the ASEAN countries ranking between 60 and 80). As consumer demand for digital services increases, governments must invest in building a robust infrastructure to support future demand

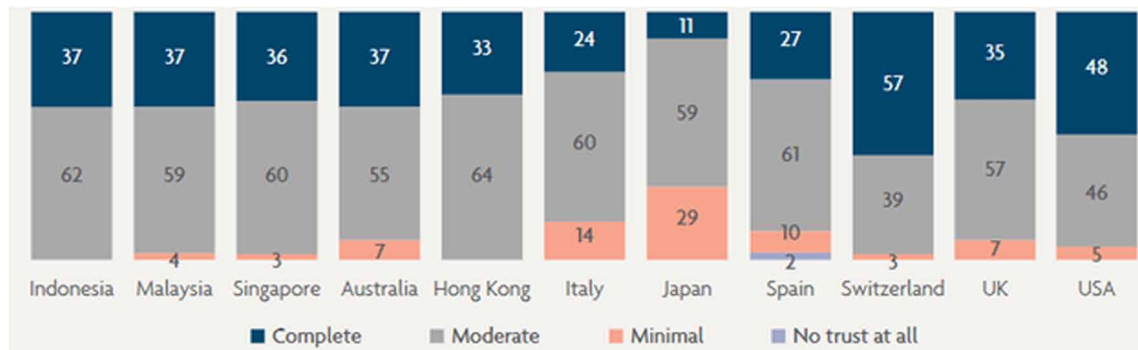
Consumer Readiness

Consumers worldwide are becoming more receptive to substitute lending channels. In the past, the main drivers of competition in the financial services industry were price, product and scale of the branch network. Today, consumer experience is the main driver of channel choice. The emphasis now is on simplicity, speed, convenience, round-the-clock connectivity and responsiveness to consumer needs.

FinTechs appear to have an upper hand in conceptualizing extremely simple and intuitive customer experiences. According to EY's Consumer Banking Survey 2016, 42 per cent of consumers globally have used an online/mobile-only non-bank financial service in the past year, signaling their willingness to try out FinTech solutions. Furthermore, 21 per cent of consumers indicated that they would consider trying out a FinTech solution in the future. In ASEAN, more consumers have used non-bank financial services in the past 12 months; 64 per cent in Indonesia, 49 per cent in Malaysia and 45 per cent in Singapore. The remainder have not used them yet, are averse to using them, do not plan to use them in the future or do not know/are unsure of how to use them.

One reason for this could be the absence of trust in online-only FinTechs, which have only been around for a few years and the consumers' desire to put their savings in safe and regulated financial institutions. For example, 54 per cent of Malaysian banking consumers said that they would not trust a financial service provider without physical branches.

Figure 7. Trust in primary financial service providers



Unlike the relationship consumers have with their bank, the relationship between FinTechs and consumers has not been time-tested. Ninety-four per cent of global consumers have not moved their primary relationship to new companies offering simpler services than traditional banks (Figure 7). Consumers in ASEAN still believe that banks are relevant, despite their willingness to try out FinTech services – 75 per cent in Malaysia, 70 per cent in Singapore and 68 per cent in Indonesia still believe that banks have an important role to play in helping them achieve their life’s goals because of their expertise across all types of financial products (Riyanto *et al.*, 2018).

Regulators Adopting to Changes

Most ASEAN countries have already identified FinTech as a major growth area and have taken steps to cultivate a supportive environment for FinTechs. Singapore is the market leader in ASEAN with the Monetary Authority of Singapore (MAS) taking a number of steps to endorse FinTech. Backed by a supportive regulatory regime and progressive policy initiatives, Singapore stands competitively among global FinTech hubs (Figure 8).

The launch of the AEC in 2015 has the potential to unlock opportunities in ASEAN. Currently, the region has differing levels of digital penetration, internet speeds, infrastructure and standards. In an effort to push innovation across the ASEAN block, the International Finance Corporation together with MAS and the ASEAN Bankers Association have established the ASEAN Financial Innovation Network (AFIN) to enable real-time collaboration and cross-border policy harmonization for better interoperability. The industry sandbox approach under AFIN will help FinTechs, banks and regulators to test new innovations and to work towards financial inclusion. It gives banks in the region access to FinTech firms with whom they can collaborate to offer banking connectivity in a cost-efficient manner. The objective of the network is three-fold:

1. Address issues of connectivity, local compliance and cross-border compatibility
2. Create an industry sandbox to provide a cloud-based testing environment through which banks and FinTech players can develop, test and refine digital finance and inclusion solutions. The cloud-based approach will help in distribution of FinTech solutions to financial institutions located in multiple jurisdictions; and
3. Facilitate discussions among participating regulators on cross-border policy harmonization

Financial Technology Implications

Figure 8. Benchmarked ranking of FinTech ecosystems globally

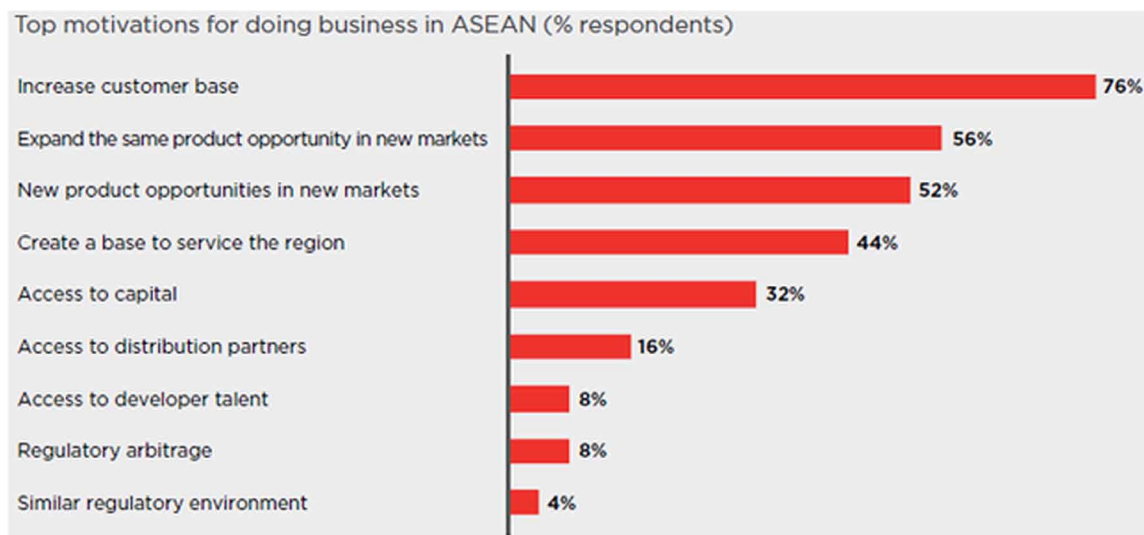
2015 rank by ecosystem attribute						
Region	Talent • Talent availability • Talent pipeline	Capital • Seed • Growth • Listed	Policy • Regulatory regimes • Government programmes • Taxation policy	Demand • Consumers • Corporates • Financial Institutions	Total points	
United Kingdom 	2	3	1	3	9	
California 	1	1	6	2	10	
New York 	3	2	7	1	13	
Singapore 	4	7	2	6	19	
Germany 	6	4	5	5	20	
Australia 	5	5	3	7	20	
Hong Kong 	7	6	4	4	21	

Relative rank: 1 = highest, 7 = lowest

Opportunities in ASEAN

About three-quarters (76%) of FinTech executives say their top motivation for doing business in ASEAN is increasing their customer base. This is followed by expanding the same product opportunity in new markets (56%) and new product opportunities in new markets (52%) (Figure 9).

Figure 9. Opportunities specific to ASEAN

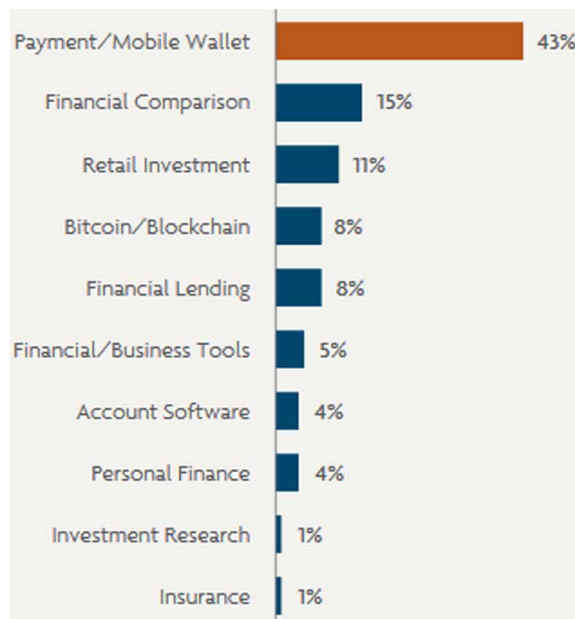


TRENDS OF FINTECH

Payments

Online payments and mobile wallets (digital payments) dominate the ASEAN FinTech industry. The main driver of the payments innovation boom has been an expansion of internet access, combined with rising smartphone ownership – enabling real-time access and a sharp increase in the number of young, tech-savvy consumers. According to a Visa survey, 36 per cent of the population in Southeast Asia are active internet users and 70 per cent shop online at least once a month. (Figure 10).

Figure 10. Density of ASEAN FinTech industry by category



Digital Wallets

Singapore is the most mature cashless payments market with the highest digital wallet penetration at 23.3 per cent, followed by Philippines, Vietnam, Indonesia, Malaysia and Thailand. The increase in smartphone penetration in these countries is expected to provide a strong push to digital wallet adoption in the future (Figure 11). There is also strong potential for penetration of digital payments into areas such as wage payments (71 per cent received in cash), government transfers (69 per cent received in cash) and utility bills (89 per cent paid in cash). In the next five years, digital payments are expected to record double-digit five-year CAGRs across countries, with Malaysia expected to grow by 20.2 per cent CAGR from 2017 to 2021 (Huei *et al.* 2018). Indonesia is also not far behind with 18.4 per cent growth and is expected to have the highest digital payments transaction value of US\$37 billion in 2021 (Figure 12).

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Figure 11. Digital wallets penetration survey results (2015)

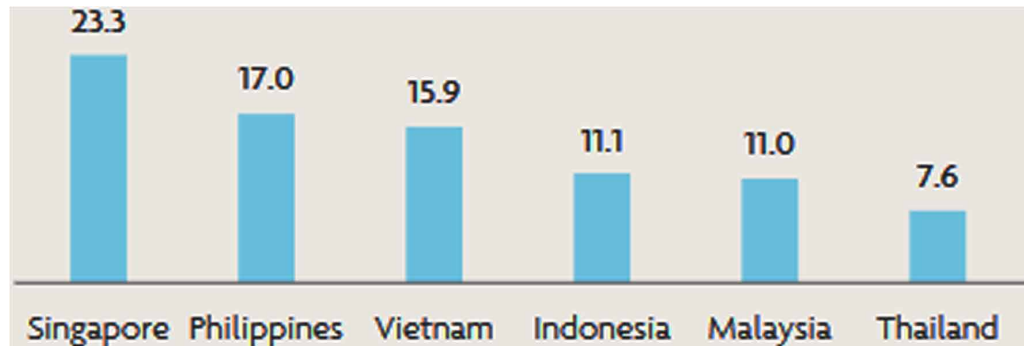
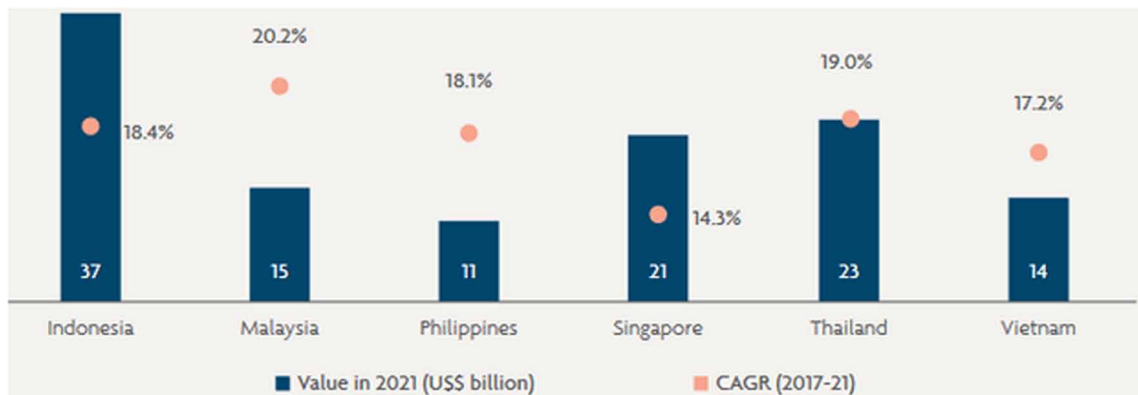


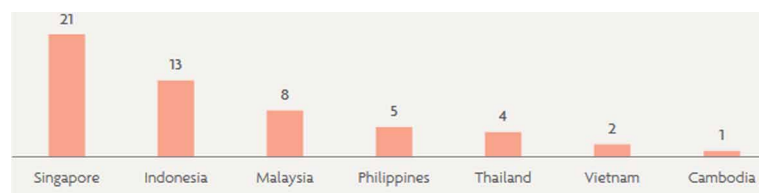
Figure 12. Digital payments transaction value and growth rate



Peer-to-Peer (P2P) Lending

The P2P lending segment has matured quickly in Europe, America, and across China since 2005. Allied Market Research predicts that the P2P market will grow at a CAGR of 51.5 per cent (2016-2022) to reach US\$460.3 billion by 2022. The next growth frontiers are ASEAN, where P2P lending is still at a nascent stage (less than 0.1 per cent of all loans are originated through P2P lenders). According to Tracxn data, there are 54 P2P lenders in the ASEAN region, which comprise eight per cent of the FinTech market (Figure 13).

Figure 13. No. of P2P lending platforms in ASEAN by country (YTD 2017)



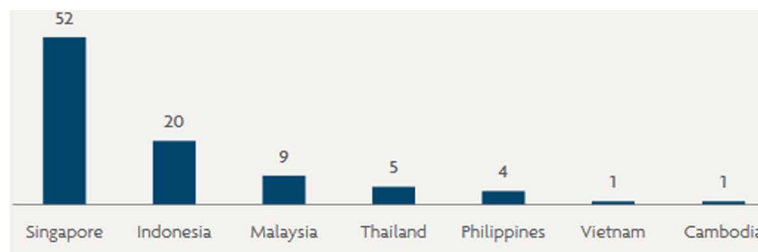
ASEAN countries have limited formal banking credit availability for the MSME sector. MSMEs (firms with <100 workers) comprise 74 per cent of total employment and approximately 41 per cent of GDP in ASEAN economies. Moreover, alternative funding sources such as venture and angel capital, private equity funds and SME exchanges are not well-developed enough to meet the growing demands of MSMEs in ASEAN. P2P lenders are leveraging technological advances to narrow this credit gap and to provide access to capital for this underserved segment.

Case Study: Cryptocurrency start-ups gain popularity in Philippines remittance industry²⁴In recent years, several crypto currency start-ups have emerged in the Philippines, providing low-cost remittance services for overseas workers. Blockchain-based remittance service providers such as Coin.ph and Toast are helping expand financial access. Coins.ph has attracted more than a million users and established a network of more than 22,000 disbursement and collection locations throughout the Philippines. In the case of Toast, the target audience is overseas workers in Singapore and Hong Kong. Moreover, mainstream Bitcoin adoption is also surging as Filipinos are turning to it for remittance payments mainly due to the inefficiency of the local banking system. According to a 2016 report, 20 per cent of remittances from the Philippines to South Korea are processed in Bitcoin. Notably, in early 2017, Bankgko Sentral ng Pilipinas (BSP), the central bank, legalized Bitcoin as a payment method and is also regulating the local Bitcoin exchanges.

Savings and Investments

The consumer savings and investment management industry is witnessing a phase of significant demographic shift as assets are transferred to the millennial generation. FinTech start-ups offering digital investment services are gaining popularity with millennials, who are tech-savvy, believe in a do-it-yourself approach and generally prefer to avoid face-to-face business interactions(Figure 14).

Figure 14. Number of savings & investment FinTechs by ASEAN country (YTD 2017)



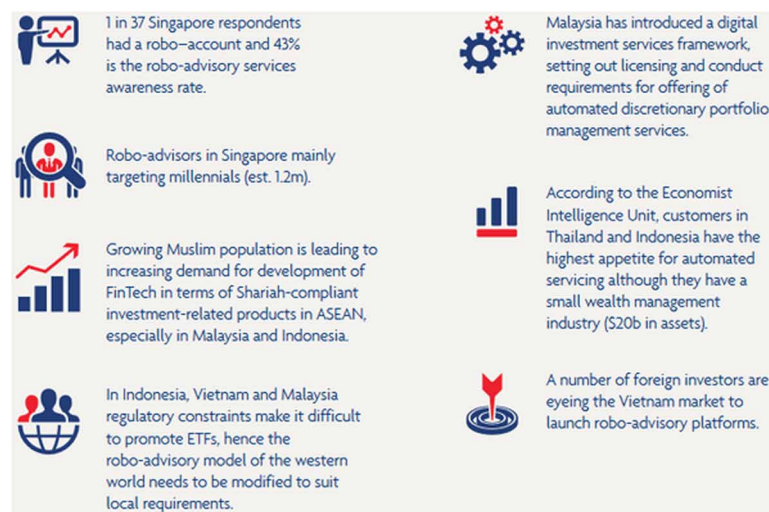
Rise of Robo-advisors in ASEAN: The emergence of the millennial generation, combined with the rise of middle-income consumer groups (traditionally unserved by wealth managers), has led to robo-advisors gaining traction. The rise of robo-advisors seeks to complement, not replace existing financial advisors who serve the wealthy in ASEAN. EY’s 2016 Consumer Banking Survey found that though 65 per cent of global consumers think having a digital presence is highly important, an equal percentage also think physical presence is highly important. Nearly 60 per cent indicate that they want to visit a branch or speak to a real person to purchase a new product or get advice, and say it is important that they can speak to a person at their bank 24/7 (55 per cent of consumers) (Figure 15)(Figure 16).

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Figure 15. Robo-advisors AUM by country (US\$ million)



Figure 16. Snapshot of various opportunities



Emerging Technology Areas

While payments, P2P lending and savings and investment remain the primary areas wherein FinTechs in ASEAN have focused their initiatives, some of the other emerging technology areas also hold strong promise

InsurTech

InsurTech is becoming a buzzword globally as FinTechs design digital innovations in the insurance sector. This is expected to lead to a rise in usage-based insurance and dynamically-adjusted premiums, while moving away from conventionally static premiums. This year, the ASEAN region witnessed strong funding of US\$75 million in InsurTech. The most funded company in this category is Singapore Life (US\$50 million).

And online aggregators, which enable better-informed insurance choices, are the most popular FinTech model across Western countries, as well as in India and China. However, in ASEAN, aggregators are not as prevalent, and even where they exist, for instance in Singapore, the functionality is still basic. Telematics – the act of transmitting computerized information – is transforming the insurance industry

globally. There are no specific regulations on telematics as yet across the ASEAN countries. InsurTech companies are also leveraging big data and internet of things to fuel growth (Raikwar *et al.*, 2018).

Blockchain

Blockchain is a potentially disruptive new-age distributive ledger technology that could revolutionize the ASEAN financial services industry, with wide applications in payments and trade transactions. Currently in the ASEAN region, beyond the payments and remittances market, blockchain exists largely in the pilot stage. Blockchain awareness is on the rise and ASEAN governments are keen on utilizing the benefits of blockchain to facilitate financial and economic development, as well as good governance. In March 2017, the MAS concluded its proof-of-concept project to test the use of blockchain in domestic interbank payments, working with the R3 consortium of financial institutions. The Malaysian Industry-Government Group for High Technology, an industry-government think tank, is collaborating with Bloke, a domestic cryptocurrency and blockchain advocacy body to develop the country's blockchain industry and encourage foreign players to enter the market.

Artificial Intelligence

Experts in the financial services domain believe that Artificial intelligence (AI) has the potential to become the primary channel through which financial service providers and customers will interact with in the next three years. In the ASEAN region, AI is still in its infancy. The banking sector has been a first mover in adapting AI but has faced difficulty in scaling up, mainly due to the lack of a skilled workforce and sufficient data. Among ASEAN countries, Singapore is planning to set up the world's largest AI hub by 2018 with the aim to establish itself as a global leader in AI technologies. It plans to incubate 100 start-ups and build intellectual property in the area of AI. The Bangko Sentral ng Pilipinas, the central bank of Philippines, is looking to utilize artificial intelligence in regulatory and consumer protection functions.

AN OUTLOOK FROM INDIAN PERSPECTIVE

Market Size and Growth in India

According to the report of The National Association of Software and Services Companies (NASSCOM), India has an existence of around 400 companies in the FinTech space, with an investment of about \$420 million in 2015. The NASSCOM report also estimated the FinTech software and services market to grow 1.7 times by 2020, making it worth \$8 billion.

The India FinTech Awards (IFTA) is a platform to celebrate and recognize the best innovations from FinTech companies. The Indian FinTech background is as follows – 34% in payment processing, followed by 32% in banking and 12% in the trading, public and private markets. Accelerators and incubators i.e., it is a company that helps new and startup companies to develop by providing services such as management training or office space, tapping the start-up ecosystem is being developed as FinTech hub and the local government of Andhra Pradesh, had opened FinTech Valley Tower to promote the investments in

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this area. India FinTech Forum represents the Indian FinTech firms as part of the Global FinTech Hubs Federation (GFHF).

In 2017, Adopting FinTech is another challenge which usually slows down the innovation, and in order to change their behavior more effort on marketing and consumer education is required. Government efforts towards promoting digitization of financial systems and reducing cash transactions in the economy have been very effective in shifting consumer focus towards digital changes for financial transactions, where the payment sector have benefited more.

Further, the FinTech sector is finding its way into the budget speech for 2017. India has the highest expected return on investment on FinTech projects at 29% versus a global average of 20%. Support from the government has increased the users' adoption plans such as Jan Dhan Yojana, Aadhaar and the emergence of UPI provided good base for FinTech companies and has also increased financial position in the country. The 'Payments' segment is the most funded in Indian FinTech landscape, because of demonetization. However, banking technology solutions are also facing strong growth and allowing financial institutions to create continuous solution delivery for end users. In spite of significant reductions in incoming global investments in the FinTech space, the India opportunity remains promising and favorable. India offers the largest unbanked population, along with a strong technology and business ecosystem.

The Indian Governmental Initiatives

The Government of India has recently pushed for financial inclusion, digitization and start-up activity has led to the introduction of policies recently which provide a strong foundation to the FinTech sector in India (Gupta and Xia, 2018).

1. **India Stack:** Through the introduction of India Stack, the government has provided a world-wide technological framework to entrepreneurs, innovators and corporations, allowing for the fastest growth of FinTech ventures. This situation somewhat resembles the policy that was offered by the government to the telecom industry in the 90's, with FinTech taking centre stage in many reform initiatives.
2. **Start-up India Program:** It was launched by the central government, includes the simplification of regulatory processes, tax exemptions, patent reforms, mentorship opportunities and increased government funding.
3. **Jan Dhan Yojana (PMJDY):** Due to this policy the Financial inclusion in the country has grown significantly, it is one of the world's biggest financial inclusion program, with an aim to facilitate the creation of bank accounts for large unserved sections of India's billion plus population.
4. **Aadhaar Adoption:** The RBI approved Aadhaar based biometric authentication, which will allow for bank accounts to be opened through e-KYC at any Banking Correspondent (BC) location. This will allow financial services companies to do e-KYC checks more economically, thereby reducing transaction costs for customers.
5. **National Payments Council of India Initiatives:** The National Payments Council of India (NPCI), has introduced the Unified Payments Interface (UPI), which has influenced the growth of mobile phones as acquiring devices, significantly reducing the cost of infrastructure for FinTech ventures and also the digital banking is expected to grow faster than ever before. These initiatives are very

helpful for a digitally enabled financial sector in India, also encourages technologies and banking experience in India.

6. **Public Relations:** The Indian government has also played a strong role in encouraging and educating consumers in the economy towards digitized monetary systems. The industry is still suffering from regulatory uncertainties and doubts, particularly with respect to new business models enabled by FinTech applications such as P2P transactions, crowdfunding and data security.

FinTech Ecosystem

FinTech is a dynamic segment of the financial services sector that is gaining much importance and disrupting the traditional financial services value chain. New Fin Tech companies and market activity are reconstituting the competitive landscape, blurring the identity of a player in the financial services sector. Below are a few sectors in FinTech that track actively and are the key areas to look at for the next wave of innovations.

1. **Integrated Digital Banking:** Financial Services companies face intense pressure to increase efficiencies and reduce costs while delivering next-generation digital services. Companies with financial technology start-ups and other non-traditional market entrants can give them the agility they need to support digital transformation and create a digital ecosystem that will retain existing customers and attract new ones (Thompson, 2017). New start-ups are emerging to meet both customer and bank needs can implement this technology.
2. **Alternate Lending:** Alternative finance refers to financial channels and instruments that have emerged outside of the traditional finance system such as regulated banks and capital markets. Examples like online marketplaces are crowd funding, peer-to-peer consumer and business lending, invoice trading third party payment platforms, etc. (Wonglimpiyarat, 2018).
3. **Robo- Advisory:** It is the use of algorithms to support the entire investing process from setting financial goals to portfolio re-balancing and monitoring whilst bringing more transparent, traceable, and efficient and customer centric standards along the overall value chain. Robo advisors destroy traditional techniques with Direct-to-Consumer (D2C) platforms. These platforms provide an easier, faster, and more user-friendly investment based solutions to both end investors and asset and wealth managers (Kamruzzaman, J., & Sarker, 2006).
4. **Cyber and Financial Crime:** Is an increasing concern for all financial institutions, from the largest global organizations to the smallest companies and partnerships. Preventing and detecting Financial Crime.
5. **Digital Payments:** FinTech is altering the way consumer and helpful in making wholesale payments. FinTech start-ups are taking payments to the next level in terms of speed, convenience, efficiency and multichannel accessibility.
6. **Augmented (AR) and Virtual Reality (VR):** AR involves a real-time view of the physical world around us, which is then improved by digital information. VR, on the other hand, involves creating a simulated world, instead of reflecting the real world around us.

Bitcoins

Bitcoin is an experimental, decentralized digital currency that enables instant payments to anyone, anywhere in the world. It uses peer-to-peer technology to operate with no central authority managing transactions and issuing money are carried out collectively by the network. Bitcoin is designed around the idea of using cryptography to control the creation and transfer of money, rather than relying on central authorities.

Blockchain

The blockchain is a new technology that combines a number of mathematical, cryptographic and economic principles to maintain a database involving multiple participants without the need for any third-party validator or reconciliation. It is a single, shared, immutable write only ledger of transactions that is updated when multiple, decentralized actors achieve a consensus on the validity of a participant's new entries. The blockchain has the potential to disrupt the banking industry to its core through its adoption for storing, lending, moving, trading, accounting, reconciling and guaranteeing money through its consensus ledger, cryptographic security and digital signature.

Online Banking

Online banking, also known as internet banking, e-banking or virtual banking, is an electronic payment system that enables customers of a bank or other financial institution to conduct a range of financial transactions through the financial institution's website. The online banking system will typically connect to or be part of the core banking system operated by a bank and is in contrast to branch banking which was the traditional way customers accessed banking services. Online banking has many features and facilitates in common:

1. A bank customer can perform non-transactional tasks through online banking such as, Viewing account balances, Downloading bank statements and applications for M-banking, E-banking, Viewing images of paid cheques.
2. Bank customers can transact banking tasks through online banking, including – Funds transfers, bill payments, Investment purchase or sale, Loan applications and transactions, Credit card applications and so on.
3. Some financial institutions offer special internet banking services, for example: Personal financial management support, such as importing data into personal accounting software. Some online banking platforms support account aggregation to allow the customers to monitor all of their accounts in one place whether they are with their main bank or with other institutions.

SECTOR CHALLENGES AND ISSUES IN FUTURE

Issues, Controversies, Problems

The digital delivery of financial services has been a focal point for investors over the past several years. While the macro-economic and political dynamics are changing, the FinTech industry remains ripe for continued innovations (Hoontrakul, 2018).

1. **Investment shake-Ups:** Everyone is used with FinTech now and even many investors are interested too. Many new investors, even within established venture capital firms, lack an understanding of how the industry works. Their actions are creating noise and interference in the marketplace. However, capital across the board has apparently slowdown. Hope many successful companies will continue to find funding despite the broader slowdown.
2. **Regulation:** Governments at all levels have taken an increasing interest in the financial services industry, post the global financial crisis. Old and new policies will have a significant effect on the success and failure of new companies. Following the U.S. presidential election, there is a widespread belief that FinTech entrepreneurs' burdens will be reduced in launching their business.
3. **Technology:** The financial services industry is largely automated on old technologies. New technologies present the opportunity to have superior products and services, but it can be challenging to get industry participants.

ASEAN Context

Government policy (licensing requirements and regulations) are said to be the biggest barrier to introducing new products or services in ASEAN, according to four in ten survey takers (40%). "Many people assume it can be done relatively easily but the culture is different and you have to make sure you have local staff," says Julian Fenwick, managing director at Governance Risk & Compliance Solutions, a "regtech" company that helps FinTechs and traditional financial services institutions comply with local regulations. Established in 2012 the company uses technology solutions to meet local compliance rules and has 250 clients across the world.

ASEAN markets differ significantly in terms of consumer preferences, technology infrastructure, regulations and policies. There are three areas that could be developed further to encourage greater levels of FinTech innovation and digital adoption.

1. **Expanding broadband access:** In ASEAN, internet connectivity is increasing but large gaps still exist. Internet connectivity remains relatively poor in rural areas, especially in Indonesia, Thailand, the Philippines and Vietnam. Universal broadband access and widespread digital literacy will help to level the playing field between urban and rural populations and promote e-commerce and digital wallets.
2. **Creating a unified payment infrastructure:** Creating a unified payments network will help ASEAN to reduce the costs and complexities of cross-border payments within the region. This includes implementing Real Time Gross Settlement (RTGS) systems, ACH systems domestically and common infrastructure standards.

Financial Technology Implications

3. Policy harmonization: Consumer protection laws vary significantly across ASEAN. At present, only Singapore, Malaysia and the Philippines have dedicated data protection laws. Indonesia, Myanmar and Vietnam have data privacy requirements as part of their respective electronic transaction laws. To create a common, unified and safe environment for customers, legal and regulatory frameworks around privacy, customs, digital trade, dispute resolution, cross-border data flow, e-commerce, and intellectual property can be harmonized.

Steps taken to create digital identities for delivery of financial and social services will lead to interoperability across ASEAN countries, boosting FinTech adoption in the region. Though it is important to achieve harmonization of regulations and practices across ASEAN, it might be challenging to achieve this in the short term. In the meantime, it is important that a regulatory framework be developed to help a FinTech operating in one country understand and navigate the markets in other ASEAN countries efficiently (Figure 17).

Figure 17. Challenges in FinTech



SOLUTIONS AND RECOMMENDATIONS

To build a sustainable financial services ecosystem, which includes a vibrant FinTech sector, it is imperative that ASEAN countries take steps to create an environment where technical, entrepreneurial and financial services talent can flourish. Currently, the FinTech workforce is relatively small in ASEAN, though the numbers are increasing. To nurture talent, countries can encourage STEM (science, technology, engineering and mathematics) education in schools and undertake a review of infocomm curriculum to replace/revise old curriculum with relevant material and skill development. Academic pathways and education initiatives are the first steps to build a healthy pipeline of talent. Universities can play a key role in providing graduate pathways to FinTechs, promoting the sector and, in the longer term, adapting curriculums (e.g. towards entrepreneurship) and spearheading research (e.g. into artificial intelligence). Having an intra-ASEAN support system that accommodates foreign talent through simple and flexible immigration policies and programmes would also be helpful in alleviating the FinTech talent supply crunch.

In order to grasp the opportunities and overcome the barriers in ASEAN, FinTech companies can consider a number of recommendations:

1. Tap into the potential: Every ASEAN market is growing in terms of size, online access and smart-phone penetration—identify which country is the best match for the business.
2. Develop an understanding of local regulations: Each ASEAN market is unique and requires in-depth knowledge of how to do business. Regtech firms are of value.
3. Consider local partnerships: Local actors understand the local environment and can ease the transition of doing business in another country.
4. Collaborate with big banks and others: Traditional financial institutions are looking for innovative ideas whereas FinTech companies can gain customer access and knowledge. There are also opportunities to collaborate with organizations in other sectors.
5. Stay the course: Many markets require time, patience and investment in order to succeed, and local business culture can reward those who stay the course without leaving too soon.

LIMITATIONS AND FUTURE RESEARCH DIRECTIONS

As opined by Gomber *et al.* (2017), the future of FinTech solutions will be driven both by innovations on the technology level and by the reaction of politicians and regulators to the new developments. Customers will appreciate technological solutions that ease usage and reduce transaction costs. Limitations of current study is that findings of earlier studies need to be validated through primary data using survey instrument. The generalizability or theory building entirely relies on inferences from probability sampling based data-sets captured from stakeholders covering ASEAN and/or Indian markets and is costly and time consuming process. Future research can utilize by addressing local concerns to proliferate FinTech (Gupta and Xia, 2018)

CONCLUSION

A booming global industry, FinTech brings new innovations to traditional financial services and in the process can help reach new population segments and enable the provision of new products and services to existing customers. Regulations, however, have largely lagged behind in this fast-developing movement, and cultural barriers are limiting expansion opportunities. Shim and Shin (2016) found that there are telecom policy implications that affect FinTech in China. This needs to be empirically validated. In ASEAN, the opportunities and challenges may be greater than any other region, given the diverse socio-economic and demographic composition of its members, ranging from the small, advanced city state of Singapore to the Indonesian consumer market of more than 260m people, the world's fourth-largest population. Although the financial industry has traditionally been an early adopter and intensive user of new developments in information and communication technology, the emergence of innovative business models and the new competitors have a tremendous influence on industry dynamics (Chuen *et al.* 2015).

In a rapidly changing economic environment and in the light of challenging and cost-intensive regulatory requirements, incumbent providers of banking business and financial services are facing a substantial transformation: Digital Finance. A more technology-savvy clientele across generations, new

Financial Technology Implications

technologies, and the digitalization of the industry challenges business models of traditional service providers. Both novel forms of disintermediation and new competitors can be observed in all relevant business functions in financial services. Against this background, most players in the industry try to design customized, intelligent, and flexible, however cost-efficient, financial products and services and strive to achieve new levels of customer centricity.

Global peer-to-peer money transfer systems, improved smartphone usage in financial transactions and the ability to use wearables also for financial transactions are interesting research topics and provide the basis for future FinTech business models. Beyond this, given the high dynamics in this field and the need for fast, nevertheless efficient regulatory answers, any academic insights on the impact of regulatory measures.

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Chapter 15

FinTech and SMEs: The Italian Case

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ABSTRACT

In this chapter, a study about how Italian SMEs understand and use FinTech technologies is presented. The study focuses on FinTech-aided banking services, in particular, due to the fact that these are, at present, the most widely used FinTech technologies available in Italy. The study shows how, despite FinTech entering Italy only in recently, the Italian SMEs market is very active and fruitful for digital companies. In the last years, a continuous growth of investment has seen the development of FinTech technologies in multiple areas, such as mobile networks, big data, trust management, mobile embedded systems, cloud computing, image processing, and data analytic techniques.

INTRODUCTION

In the last years, the term Financial Technology (FinTech) has been adopted in order to describe a wide range of services, aided by several financial technologies (Gabor & Brooks, 2017), for different types of organizations, which mainly address the advancement of quality of financial products and services

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supported by Information Technology (IT) applications. FinTech has become important due to several important factors, ranging from technical advancement, enterprises innovation, the need for reducing costs, and for improving the relationship with the customers. The high speed in which FinTech has been adopted caused a great challenge, due to the multidisciplinary, advanced usage of integrated platforms, and increased demand for such services (Gai, Qiu, & Sun, 2018). FinTech is supported with the development of cutting-edge technologies, among which the most relevant are those that can discover hidden information from various sources and thus improve the decision-making process in SMEs, which influence security, and enable easier communication with customers.

In Italy, from the end of the first decade of 2000, almost all banks decided to follow new paths, starting a process of exploiting digital opportunities and moving clients onto more agile and less costly channels (i.e., Internet Banking and Mobile Banking) envisioning novel ways for serving clients and generating profit (Premoli, 2017).

The chapter has three goals. The first goal of the chapter is to analyze the wealth of digital possibilities, embedded as FinTech solutions and strategic partnerships, that are available for banks to improve their current portfolio of products and services. The second goal is to provide the overview of the FinTech solutions for SMEs, with the focus to Italian banks and FinTech, and to provide the overview of two main venues for increasing their competitiveness: (i) online advisory and internationalization for SMEs, and (ii) product standardization and multichannel distribution. The third goal of the paper is to analyze the main emerging and disruptive technologies in banking domain, adopted by the FinTech industry today (e.g., big data, data mining, text mining, blockchain, AI), which provide a rich source for future research directions for FinTech.

The abovementioned goals are attained by (i) conducting a comprehensive literature overview, focusing on cutting-edge research in the area of disruptive technologies (e.g., big data, data mining, natural language processing); (ii) investigating the grey-literature research in order to collect knowledge on Italian FinTech, such as case studies, white papers and industry position papers.

The chapter consists of the following parts. After the introduction, the background of the research is provided, focusing on Italian SMEs and their significance for the economy. The third chapter discusses FinTech as a new venue for advancing financial products and services, presenting the main technologies used for FinTech applications, the relationship between FinTech and innovation, and the role of FinTech as a disruptive technology in the Italian context. The fourth chapter aims at providing solutions and recommendations for FinTech and Italian SMEs, while fifth chapter provides the overview of future research directions for FinTech, such as big data, data mining, text mining, and others. Finally, a conclusion is provided.

BACKGROUND

The Relevance of SMEs in the Italian Economy

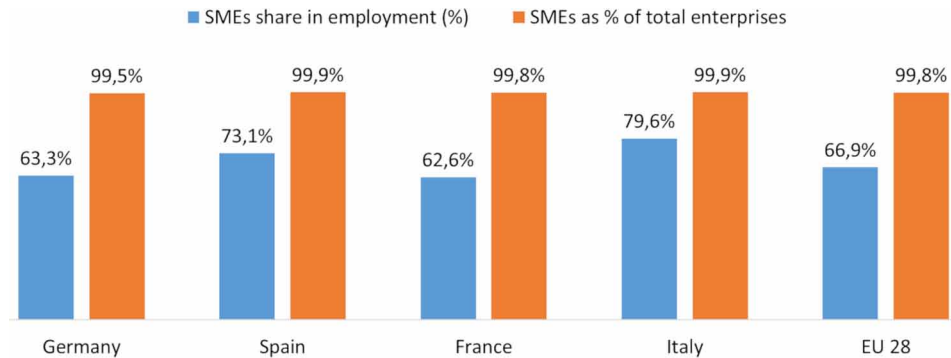
Small Medium Enterprises (SMEs) are the most widely spread companies in the European Union and are considered the true engine of economic growth. Indeed, SMEs represent 99.8% of European companies (93% are micro enterprises) in the non-financial business sector. For this reason, they also play an important role in the European labor market. Almost 90 million people were employed in SMEs in 2015 (67% of total employment), and they generated 58% of the sector's value added (Muller et al., 2015).

FinTech and SMEs

In Italy and Spain, in particular, the share of workers employed by small companies are equal to 79.6% and 73.1% respectively (Figure 1).

Figure 1. The share of SMEs participation in employment, and total number of firms in selected European countries

Source: Muller et al. (2015)



Before the financial turmoil of 2007-2008, the number of jobs in SMEs ‘increased at an average annual rate of 1.9%, while the number of jobs in large enterprises increased by only 0.8%’, as indicated by the report *European SMEs under Pressure: Annual Report on EU Small and Medium-Sized Enterprises. SME performance review* (European Commission, 2010).

European Commission uses four quantitative criteria in order to define the size of the company (European Commission, 2003): ‘(i) the total number of employees in the enterprise; (ii) the annual volume of the turnover; (iii) and the total of the assets in the enterprise balance, and (iv) the degree of independence of the enterprise or the ownership over it’. Different values of these criteria according to four groups of enterprises according to size: micro, small, medium and large are depicted in Figure 2.

Figure 2. Criteria for classifying companies according to size

Source: European Commission, 2010

	Employees	Revenue	Assets
Micro	< 10	< €2 million	< €2 million
Small	10-49	€2 – €10 million	€2 – €10 million
Medium	50-250	€10 - €50 million	€10 - €43 million
Large	> 250	> 50€ million	> 43€ million

The number of employees (the ‘staff headcount criterion’) is the main criterion; introducing a financial and ownership ‘criterion is nonetheless a necessary adjunct in order to grasp the real scale and performance of an enterprise and its position compared to its competitors’ (European Commission, 2003). Therefore, to classify an enterprise, the condition a) must be present and accompanied by some employees and the size of the revenue or assets. Finally, the ultimate condition, the ownership, states that ‘the participation of a big enterprise in the ownership of a small or medium enterprise should be of no

more than 25% of its share capital' (European Commission, 2003, p.2). However, 'in order to encourage the creation of enterprises, equity financing of SMEs and rural and local development, enterprises can be considered autonomous despite a holding of 25% or more by certain categories of investors who have a positive role in business financing and creation' (European Commission, 2003, p.3).

Nowadays, the recovery from the financial crisis indicated the need for the economies to create employment opportunities for the citizens. Hence, given the contribution mentioned above of SMEs to employment, the growth and creation of SMEs are essential.

As shown in Figure 1, SMEs are extremely important in Italy, much more than in other European big countries, such as France and Germany. The result is expected, since many Italian SMEs, particularly in the manufacturing industry, are famous all over the world: 'made in Italy' is considered a guarantee of the high quality of the products. The downturn of 2008 has created several problems for Italian SMEs, undermining their ability to generate profit and, not less important, to generate cash. From the beginning of the crisis to 2015, more than 82.000 firms have failed with the consequent loss of almost 1.000.000 employees. Many of them died not because they were not profitable anymore, but because of lack of cash. Banks were almost forced to deny credit to many small companies, more opaque and riskier than large corporates, thus deteriorating SMEs' situation.

As already said, SMEs are the basic element for the Italian economy. Hence it is fundamental to sustain them during difficult periods and help them re-finding the path of growth. This can be done both with the politic support of the government, through ad hoc fiscal policies to unburden the firms, and with the monetary support, i.e., banks that give credit to companies in order to finance their day-to-day operations and new profitable projects.

Business clients are an important market segment for the banks (Rajaobelina, Brun & Toufaily, 2013) in particular the small and medium enterprises (SMEs). First, SMEs are the vast majority of companies, both in Italy and throughout Europe. Second, even if their turnover is substantially smaller than those of large companies are, SMEs still need a variety of banking products and services in order to support their day-to-day operations (Dhliwayo & Governor, 2014). Also, SMEs are less ready, than large corporations, to move from one bank to another in order to reduce their financing costs, such as the minimum possible interest rates (Sayani, 2015). Therefore, SMEs are potentially more profitable clients for banks.

Furthermore, successful SMEs have the potential for growth, and with the right support and the right choices of financial products, they can increase their turnover, and even grow to the size of large corporations. If a bank recognizes their potential early, such fast-growing SMEs can become the most loyal clients for the bank. Above stated indicate that banks are keen to innovate the portfolio of their products and services, in order to provide an attractive offer for the SMEs, providing not only standard digital products but also pushing on value-added services, supported with digital technologies (Chen, 2016).

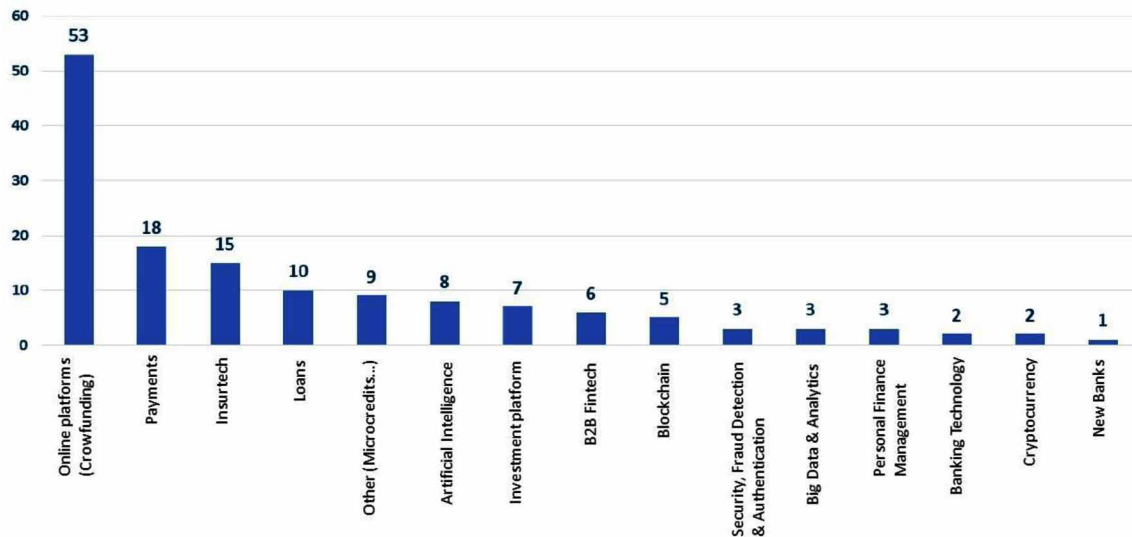
FinTech as a Disruptive Technology in the Italian Context

Following the 2017 report by ABI (Associazione Bancaria Italiana), innovations promoted by FinTech can not only be an opportunity to develop alternative services, but can also support the operations of banks, such as credit rating techniques (ABI (Giovanni Sabatini), 2017). Italian banks have already determined as a priority the relationship with FinTech. The present Italian scenario is made up of 136 FinTech companies that have launched 145 initiatives as shown in Figure 3.

FinTech and SMEs

Figure 3. Italian FinTech initiatives

Source: Adapted from ABI (Giovanni Sabatini), 2017



The main Italian Groups and Banks are implementing new partnership strategies with the various FinTech start-ups through:

- the creation of dedicated investment funds, both Italian and international,
- commercial partnerships,
- targeted investments in the capital of certain FinTech start-ups,
- the creation of accelerators and incubators for the development of FinTech,
- international observatories for FinTech's innovation scouting activities, and
- joint research and development activities with the FinTech world.

As stated in the 2017 by the Italian FinTech Report (NetConsulting, 2017), banks and financial operators are beginning to show signs of concern about FinTech and the way it could pose a threat to traditional business, as emerges in PWC's Global FinTech Report 2017, which involved over 1,300 respondents (Financial Companies and FinTech) in 71 different countries around the world, including Italy.

The report highlights that 89% of European banks and 82% of Italian banks claim to see FinTech as a possible threat, in particular in some areas of the value-chain such as Payments, Robo-Advisoring, and Personal Financial Management. To avoid the possible threat of FinTech and turn it into an opportunity, 41% of traditional Finance operators have entered into partnerships with these start-ups, while 84% say that, in order to better face the challenges that the digital transformation requires, they intend to start cooperation programs with newly established companies in the next 3-5 years. The scenario is therefore in strong evolution, and the collaboration with FinTech represents an opportunity for banks to accelerate the process of innovation.

FINTECH AS A NEW VENUE FOR ADVANCING FINANCIAL PRODUCTS AND SERVICES

FinTech would not be possible without the advancements in the new technologies, as well as a rapid decrease in the prices of hardware and software solutions, as well as supported by numerous open-source initiatives. This, in turn, resulted in the explosion of innovations supported and developed by FinTech solutions.

The Main Technologies Used for FinTech Applications

FinTech is a term denoting financial services aided by technological innovation, which can take the form of new business models, processes or products, with a decisive effect on the financial markets, the institutions, or on the supply of services: the use of technology, therefore, constitutes a prerequisite to make financial innovation possible (Van Loo, 2018).

FinTech innovations include financial services supported with various information and communication technologies (Gomber, Kauffman, Parker & Weber, 2018). FinTech covers various services: crowdfunding, peer-to-peer lending, payment services (e.g., instant payment), virtual currencies (e.g., Bitcoin), and consulting services (e.g., roboadvisor). Also, it uses technologies for the decentralized validation of transactions (e.g., Blockchain), biometric identification (e.g., using fingerprint, retina facial recognition), and the support for the delivery of services (e.g., with the utilization of cloud computing and big data). FinTech is present in numerous banking and financial services markets. For example, it allows the entry of technological start-ups, and the giants of the information and social media technology (Google, Apple, Facebook, Amazon, Alibaba).

Morgan (2017) defines five broad technological areas currently adopted by the FinTech industry today: (i) artificial intelligence and machine learning, (ii) application technologies interfaces, (iii) Blockchain, (iv) human digital interfaces, and (v) quantum computing.

Artificial Intelligence and Machine Learning.

In recent years there have been numerous debates on the contribution that Artificial Intelligence (AI) and Machine Learning (ML) can make to the banking and financial world. In its broadest definition, AI is identified as mere cognitive computing, with the meaning that it can increase human intelligence, but not replace it. In the financial field, AI has made a fundamental contribution to the identification of innovative techniques for fraud detection. Another important area has been the definition of intelligent systems that satisfy a whole series of compliance regulations, capable of keeping companies up to date with regulations that are constantly evolving. AI-built chats are an excellent tool to help operators to handle customer requests accurately and quickly, or in some cases even to replace the human operator. In the financial sector, AI is used for simulations of financial stress situations or for building predictive models to support decision-making activities. However, its potential will be utilized to the greatest extent only if it is combined with big data, which is one of the most fruitful directions of the future research for SMEs and FinTech.

Application Technologies Interfaces (APIs)

The use of APIs has been a key element in making the landscape of new services, also in the form of mobile apps, more lively, which have made it possible to keep pace with the economic and business challenges that the financial industry has been facing for some years now. FinTech start-ups have been able to create high technological value software that has challenged, and in some cases surpassed, a consolidated but, for this reason, rigid banking sector. Banks had to incredibly increase their investments in technology both internally, improving their ability to create innovative mobile applications, and by participating in developer sandboxes through the release of APIs.

Blockchain

The blockchain is distributed architecture that make financial areas with a high risk of fraud more reliable and transparent. By establishing consortia, large financial operators are working together to create new infrastructures based on this new technology, with the aim to replace obsolete and non-integrated systems. This process is affecting both commercial financing platforms and cross-border payments. Thanks also to digital identification, Blockchain is becoming an important asset in overcoming financial mechanisms rigid due to the high rate of fraud and lack of transparency. By eliminating these rocks within business processes and by creating innovative networks, Blockchain is making the exchange of value through ecosystems effective and efficient.

Blockchain represents a type of disruptive technology having a big impact on cost-savings, labor-saving, transparency, security, and others, having significant implications in banking and finance (Cocco, Pinna & Marchesi, 2017). Guo and Liang (2016) point out issues of regulation, efficiency, and security. FinTech Network (N/A) quotes the following possible uses of blockchain: reduction of fraud, which represents one of the main challenges in the banking sector; Know Your Consumer (KYC) by including data of KYC; trading platform; new way of payments, allowing banks to operate 24h/day, and many others.

Human Digital Interfaces

Digital devices have long been part of our daily lives. Nowadays, they can accept both voice and touch screen commands. Biometric identification systems are widespread in many areas and can cover both fingerprint or face recognition and retinal scans.

Quantum Computing

A computer based on quantum computing uses qubits instead of bits, allowing it to go beyond encoding two-state information (0.1). A quantum computer can therefore greatly increase the amount of information it can store while consuming less energy. Although quantum computers cannot be expected to replace traditional computers in the foreseeable future, they are already used today to solve very complex computing problems, such as maximizing the return on investment based on a given risk profile. Through the combined use of artificial intelligence and automatic learning, they can make calculations that are extremely fast but also highly reliable. Areas such as fraud detection or money laundering are particularly promising for the use of quantum computing.

All these technologies play an important role in the Italian FinTech context as shown at the Italian FinTech Forum held in Milan on April 12th, 2018.

FinTech and Innovation

FinTech is an industry that continues to be at the forefront of innovation (Gomber et al., 2018; Leong, Tan, Xiao, Tan, & Sun, 2017). While security risks remain, the winners are consumers who see the benefit and functionality in their banking and financial experiences, thanks to these trends in FinTech technology (Lee & Shin, 2018). Therefore, the possible reasons for the success of the high number of start-ups active in FinTech and the giants of ICT, reside above all, in their inherent capacity to create technological innovation and, secondly, the speed with which these can implant the innovations achieved in old and new services, being free from pre-existing technological systems (so-called 'legacy systems'). At present, FinTech companies can offer a wide range of services of financing, payment, investment and consulting with high technological content and at competitive prices; their activity contributes to the development of non-banking sectors, closing a gap in the capital market (Gai et al., 2018).

The current and prospective demand factors are important too. The demand of financial services with a high technological content is set to increase with the growth of the share of the population familiar with digital services, in particular, young people, the so-called millennials and digital natives (Jones, Ramanau, Cross, & Healing, 2010). However, at this moment, it is obvious that the FinTech innovations structurally simplify how customers use financial services. In that case, they will enable financial transactions to be carried out easily in each case, everywhere, and at any time, there is connectivity, using clients own mobile devices. What is even more important, even as they are primarily aimed at digital natives, FinTech also facilitates the most populous cohorts of older and less computer literate customers.

However, the future scenarios are uncertain. The first scenario is that a configuration of the financial system in which actors, currently outside the regulatory perimeter, would continue to remain outside, offering technological intermediaries and financial services preparatory to the development of new ways of intermediation (which would remain in the hands of the traditional intermediaries). The second scenario is that FinTech could mark the entry of the same computer technology giants and social media in the financial system, strongly stimulating the competitiveness of the financial system. In this case, the erosion of market shares would also occur thanks to the ability of these subjects to exploit the micro-data of their customers, profiling the characteristics of customers and offering them integrated services, including, for example, the online sale of products through payment or credit services dedicated (Aldás-Manzano, Lassala-Navarré, Ruiz-Mafé, & Sanz-Blas, 2009).

A secondary effect of the FiTtech is that the entry of new operators into the financial system already obliges intermediaries to react by investing more in technological innovation to reduce costs and to automate processes in order to re-modulate distribution channels for offering customers innovative and high-quality services. At the international level, it is estimated that the investment for the development of FinTech projects exceeded 25 billion dollars in 2016 (European Central Bank, 2016). North America is the leading region for investments (55 percent of the total), followed by Asia (34 percent) and therefore from Europe (9 percent). Investments in Italy are still limited compared to other European countries, such as the United Kingdom, Germany, France, and the Netherlands, due to a low presence of FinTech companies and a still traditional banking business model, moreover, the network of branches is not very automated and the entire system is mainly based on it.

FinTech and SMEs

Therefore, FinTech can be a driver for innovation in the financial industry, seeking new business models and recovering satisfactory margins of profitability. For smaller intermediaries, the probability of inaction could be even higher, due to the high investments required and the problems of coordination between a wide range of actors during the strategy definition and the implementation of platforms of services of common interest.

FinTech Solution for Italian SMEs

As claimed by the 2018 BeBeez Report on FinTech (BeBeez, 2018), the FinTech revolution began in Italy almost in silence, with the first web platforms of loans between private individuals born between 2012 and 2013. There was a jump between 2016 and 2017 in terms of new services, and now, thanks to the new European directive on payment services (Payment Services Directive 2 or PSD2), we are on the eve of another big leap, with a series of new services that individuals and businesses can use to pay, transfer money and check the status of their accounts. In this framework, all the start-ups that develop technologies to support these are then included services and thus technologies for mobile payments or services of big data analysis and structuring of Blockchain.

In the world, the FinTech sector has already attracted billions of dollars of investments by venture capital funds, but also by the private equity funds. The sector has already attracted investment of 5.42 billion euros in the retail sector. The data are from CB Insights, which specifies that this is the third value highest recorded since the beginning of 2013, after that of the third quarter 2015 at €5.5 billion and the second quarter of 2017 at €5.5 billion.

SOLUTIONS AND RECOMMENDATIONS FOR FINTECH AND ITALIAN SMES

In this chapter we focus to the main two venues for the Italian SMEs and financial institutions to utilize FinTech solutions in order to increase their competitiveness: (i) online advisory and internationalization for SMEs, and (ii) product standardization and multichannel distribution.

Online Advisory and Internationalization for SMEs

As previously stated, a great portion of NPL (i.e., the amount of non-performing loans over total loans) in banks' balance sheets derives from corporate clients, especially the smaller ones. The reason behind this evidence is straightforward: many SMEs do not have sufficient financial knowledge. This is particularly true in Italy, even if it is a general problem of SMEs from all over the world. Generally, Italian entrepreneurs have great ideas and can deliver niche products, also requested from foreign countries. Thus, the default of many SMEs is often due to a lack of financial expertise and dangerous financial choices and not because of a poor product, difficult to sell on the market. Premoli (2017) provides the recap of some of the most interesting products that came out from the analysis of the Italian bank's services. Starting from

The actual relationship between banks and firms is based on a dispute for the lowest spread on the loan or the line of credit, without reasoning on the value-added elements. Usually, what SMEs need is deep support in financial activities, such as instruments of cash flow forecasting and the right advisory on how to finance an investment or what the main movement of the markets are. Indeed, many SMEs

do not have an internal solid and specialized accounting, finance, and control business unit and, consequently, do not have a Chief Financial Officer (CFO) that takes reasonable decisions with a financial viewpoint. This lack of financial knowledge often brings small firms to undertake hazardous actions that in some years lead the business to fail.

Online Advisory

In this field, the digital can have an important role. The online advisory is already a reality for the retail clients of many digital banks in Italy, such as Wediba and Fineco, and soon can affect the corporate segments. Such digital capabilities are playing a significantly greater role in the selection process of the banks. According to a research performed by The Boston Consulting Group (BCG), ‘after financial stability, service excellence, and business understanding, customers rated digital capabilities the most important factor in evaluating their business-banking relationship requirements.’ In the same research, they highlighted the importance of human interaction that, however, must be accompanied by new digital solutions because ‘banking clients expect those one-on-one relationships to be complemented with smart, tailored, digitally enabled service’ (Boston Consulting Group, 2016). By now, the two leading banks in Italy, UniCredit and Intesa Sanpaolo, have developed some interesting digital tools to support their small business clients. In particular, UniCredit merchants that need a POS to run their business can activate a service that gives to business owners a set of intuitive graphs and synthetic prospects, useful to deepen their business trends and the buying habits of their customers.

Another interesting product offered by UniCredit is a tool for all the SMEs that have more than one banking account. This product offers not only an aggregated view of all the expenses and financial situation of the firm but also help it to understand what could be the most suitable financing products according to its operations and its current situation. Furthermore, it is possible to manage autonomously advanced payment of account receivables. On the other hand, Intesa Sanpaolo offers to its small business customers an online platform where they can publish request of commercial collaborations, acquisitions, sales and meet online firms also coming from foreign countries.

Internationalization

It is known that export is a fundamental component of the Italian economy and foreign countries very well appreciate Italian products. Moreover, the increasing globalization of the market is pushing several companies to find new interesting customers abroad. Sometimes this is an issue for small businesses that are used to sell their products within their border and do not have sufficient means and expertise to go out of the country. For this reason, many banks are developing online platforms, such as the Intesa mentioned above Sanpaolo, able to support SMEs in their expansion abroad.

In Italy, this kind of digital solutions is also spreading through smaller banks that want to be among the first movers of the country. A practical example is BPER, that recently launched a platform developed to increase and improve the internationalization paths of the firms, providing directly online the resources and information needed by answering four simple questions. A similar product is also offered by some European banks. An example is provided by BBVA, the second biggest bank in Spain, which offers a digital web platform that supports Spanish SMEs that would like to expand their business overseas using advisor’s expert in different markets and sectors.

Nevertheless, different businesses belong to different sectors, and their related economics are different from one industry to another. For this reason, it would be better for some banks to specialize in specific industries and become a leader of that specific segment of firms. SMEs need an advisor that deeply understand the challenges of a specific market, that help them recommending where to invest and not to invest, and that can forecast possible development of the market and the connected impact on the cash flows of the firms. Logically, the choice of the target industry, such as agribusiness, energy or mechanic, will depend on the specific context of the local market, on the dimension of the industry and on the possibility to create differentiation with respect to other banks. Industry specialization would mean, for example, to create tailored products for that industry, to hire specialists coming from that industry that become valuable advisors but also useful risk managers because the economics of an agribusiness firm is radically different from the ones of an energy firm and experts would prevent to take unnecessary risks.

In Europe, Rabobank is one of the banks that provides a real application of this solution. The Dutch bank has developed, besides a generic but well-detailed platform that gives online advisory and insights of several markets, a specific platform for the agribusiness. FAR, that stands for Food & Agribusiness Research, and Advisory is a platform that provides many reports created by more than 80 food & agribusiness research analysts that collect information and spot opportunities using local knowledge and global reach.

Of course, not all the solutions described so far lead directly to an increase in the revenue of the bank. Nevertheless, they have two main effects that will be visible in the end. On one side, firms will become more autonomous and will not need to visit a branch to have financial advisory, with some clients that may ultimately opt for a digital self-service model. The digital approaches will enable the advisors to spend more one-on-one time serving as strategic advisors to high-value clients and to use digitally enabled tools and channels to streamline service and expand client reach. On the other side, banks may sustain those high-value small business clients during their growth, benefitting from the long run partnership and the different products and services that the companies may need to run their expanding business.

Product Standardization and Multichannel Distribution

Significant and unnecessary product complexity is a burden for numerous large banks (The Bain.com, 2016). This complexity brings to a wide number of superfluous costs that banks are not willing to sustain anymore. Often, each product has different risk management processes, as well as separate operations and technology. Moreover, the current banking service model is based on an undifferentiated product/service offering for each type of counterpart that carries to a strong reduction of margins, especially for small size financing.

Consequently, smaller firms have much more difficulties than larger ones in obtaining financing, avoiding them the possibility to invest and to grow. In order to manage this product complexity, some leading banks are pursuing different approaches for different segments of customers. According to Bain & Company, in general, small businesses with relatively simple needs, are interested in a modular bundle of standard products. Larger firms, instead, are more complex than SMEs and require more advanced auxiliary products and advisory solutions.

Thus, in order to make the process of funding to SMEs more efficient and to increase the satisfaction of this segment of customers, the credit offering to SMEs must be revised by the banks through new models. One possible solution is the creation of financing products easy to buy and rapid to access, similar to the ones already existing for consumer credit. Even if the rate is a fundamental component

in a financing offer, it is not the only element that has to be taken into consideration by the borrower. Nowadays, banks should avoid the competition exclusively on the rate, which currently would bring just to a bloody war. Instead, the credit offering to SMEs should aim at satisfying other real needs of the firms, such as the reduction of the initial costs for the preparation of the procedure, transparency on the modality of costs calculation and reduction of both the scrutiny and issue time. Hence, among the critical success factors of SMEs financing, there are rapid credit access and a standard product offering with user-friendly interfaces and different channels. With this mind, banks should industrialize processes and build simple products regarding the offering, pricing and required guarantees with the aim of reducing the managing costs of these contracts.

One possible example of this type of product could be financing without a mortgage guarantee, with a fixed rate, sureties and definite and rapid time for the approval and the issue of credit (KPMG, 2016). This kind of product could be offered through digital channels, with the support of the digital sign, or through the net of branches, mainly to SMEs with a consolidated relationship with the bank. The simplified process is as follows: (i) SME requires small size loan, (ii) using website of the bank SME chooses the most acceptable product, (iii) SME sends the needed documentation over the web form, (iv) bank checks the eligibility of SME for financing, and (v) the amount is paid at the SME's account. The benefits stemming from this solution would be the ease of offering and issue of credit and the extension of the services offered, useful for customers' retention. Moreover, the creation of standard products would lead to a more industrialized process, with considerable benefits regarding efficiency and costs reduction. Currently, a Poland bank offers a similar product for retail customers and is aiming at doing the same also for corporates. Its process is quite simple and divided into three steps: (i) First of all the customer determine the amount and tenor of the loan, and the rata is immediately computed, (ii) Subsequently, it has to accept the terms and conditions of the loan, and (iii) at the end, the loan is available in around 30 seconds from the confirmation.

Of course, product offering must be aligned with the customers' characteristics of the specific region but is indubitable that every bank requires a digital transformation. Nowadays, many banks offer a simple internet banking platform with a limited number of actions available. Usually a firm, but the same is valid also for retail clients, can only check its balance and manage its money in a limited way, but it cannot sign up for a loan or interact directly with a representative. The future of the bank will probably lead to an integrated multichannel offering where customers can perform the same activities through each channel in the same way. Going digital does not mean giving up branches, because the physical interaction with people will remain an important component, while it means that branches have to change their functions and have to be completely integrated with the digital processes.

FUTURE RESEARCH DIRECTIONS FOR FINTECH

Big data and artificial intelligence (AI), use of machine learning (ML) together with data mining and texting or natural language processing (NLP) techniques, blockchain and new ways of human-computer interaction drive the growth of new opportunities which can influence business processes and strategies.

Analysis of researches shows the growing interest in technology innovations in the form of products which have an impact on business processes, models or strategy for the institutions. Deloitte (2018) identifies main issues critical for long-term growth: customer centricity and organizational agility, regulatory compliance aligned with business strategy, technology asset that differentiates the bank, greater

protection of cyber risks, FinTech and BioTech for innovations, reinterpreting/defining new roles of the workforce with increasing automation and diversity.

Big Data

Big data is mostly analyzed through interactions among consumers, institution and technology. Big data is the key driver for successful machine learning. Banks and financial institutions use various research techniques to extract information from big data relating to structured, semi-structured or unstructured data, mostly agreeing on the following (Evry, N/A):

Big data was born out of the necessity of datasets growing so large and complex that traditional tools are no longer sufficient to process this data. By aggregating large amounts of data from many different sources makes big data very powerful for business decision-making, revealing insights and behaviors faster and better than otherwise possible with traditional BI.

Therefore, one of the most fruitful areas for the future research directions in FinTech is the *big data*, due to the fact that most of the analysis in financial sector is performed on structured data, and appearance of big data has triggered analysis from semi-structured and unstructured data, e.g. appearing in customer reviews (BaFin, 2018).

Turner, Schroeck, and Shockley (2012) indicate that big data is today business imperative for a long-standing business challenge for banking and financial sector, but still hard to find out on what financial services they are based. However, big data is useful only when the collected large databases are analyzed using data mining and text mining methods. Recently, social network analysis has also proven to be a fruitful area of big data analysis.

Financial sector and banks are among early adopters of big data technologies, showing the main trends in big data analytics of financial sector (Alexander, Das, Ives, Jagadish, & Monteleoni, 2017; Moro, Cortez, & Rita, 2015; Srivastava & Gopalkrishnan, 2015; Turner et al., 2012). Some of the possible researches include: customer analytics (such as customer understanding and activation, customer segmentation and profiling, enhancing customer engagement, retention, and loyalty; detecting customer needs, quality analytics, sentiment analysis, best offer, customer gamification, and others), development of new business models (w-banking, increase in revenue, better understanding customer needs, use of historical data for predictive models, forecasts and trading impacts with real-time view of data, new communication channels), operational optimizations (ability to collect data, aggregation and integration of a variety of data such as reports, transactions, e-mail, logs, social media, free-form texts, external data, geo-spatial, audio, images, sensors, and others), high-capacity of warehouse, data quality management, strong analytic capabilities, risk and fraud management (risk detection, credit approval, crime management, confidential information leaking, mail spamming), and others.

Data Mining

Data mining is the process of discovering patterns in large data sets, using different methods, among which machine learning (ML) the most often used. According to Moro et al. (2015) data mining is focused to extract useful knowledge (e.g. trends, patterns) from unstructured or semi-structured file, databases, XML files in order to create data-driven models, such as classification (if output data is a categorical

value) or regression model (if output data is numerical value) or clustering. Today financial institutions and banks are faced with more demanding customers who seek low-risk investments and products relevant for their needs, while financial institutions re-evaluate the market situation and customer needs, searching for hidden information in unstructured data, which can influence the decision-making process. Mak, Ho, and Ting (2011) indicate that data mining in finance domain could improve workflow and deepen understanding of investment behavior.

According to Financial Stability Board (2017), financial institutions use machine learning methods (e.g., classification, regression, clustering) to analyze data on transactions and payment history to generate credit score and speed up a decision on lending or risks. On the other side, financial institutions turn to exploit semi-structured and unstructured data to extract more subtle customer opinions (e.g. opinion on some products, willingness to pay, to raise the loan) or data from social networks, text messages or mobile phone use. According to some researches, there is an increased use of voice-to-text communication, which can generate new amounts of data, which can be then integrated with existing data. However, usage of personal data opens issues on data confidentiality, privacy, and protection.

Customer-centricity is one of the key drivers of banks' growth, as pointed out in numerous researches. Ivanauskienė, Auruškevičienė, Škudienė, and Nedzinskas (2012) analyzed factors of consumer-perceived values in the retail banking sector during the period of economic recession, conducted on customers of commercial banks in Lithuania. The study showed that in the period of economic recession in transitional economy the following factors were present: emotional/ affective factor (when contacting with bank personnel, positive atmosphere, security, trust in bank personnel, satisfaction with conducted transactions) and functional factors (quality of service, price, contact personnel competence, physical environment), but also social factor (including opinions of others, established relationship). Data mining (DM) is the method that can support banks in attaining these goals. Hassani, Huang and Silva (2018) analysed the most often used data mining implementations in banking, until 2013, indicating that data mining algorithms were exploited in the last decade mostly for improving customer satisfaction, marketing and optimization of strategic management, while recent applications target security and fraud detection, risk management and investment banking, as well as customer relationship management (CRM).

Through predictive and prescriptive analytics, banks use technology in a way to gain direct impact on business, such as possible customer churn, marketing, and sales activities, cross-selling activities, fraud detection, customer relationship management (CRM), workforce development, and others.

Asare-Frempong and Jayabalan (2017) performed an analysis of direct marketing focusing on customers who expressed likelihood by subscribing on products, offers, and other packages. They aimed to predict customer response to direct bank marketing by the classifier, i.e., neural networks, decision tree, logistic regression, and random forest, attaining the accuracy of 87%.

Sun, Morris, Xu, Zhu, and Xie (2014) presented Intelligent Customer Analytics for Recognition and Exploration (iCARE) framework to analyze banking customer behavior for retail banks from banking big data. Budale and Mane (2013) used predictive analytics in retail banking to gain insight in improving the relationship with the customer and devise mechanisms for marketing in order to prevent switching to another bank. Results were used to predict churn probability of customer, product preferences and customer lifetime value.

Somal (2017) suggested customer metrics relating to the customer itself, opinions, feelings and attitudes, customer profile and relationships, customer goals and objectives, with examples on Royal Bank of Canada, Toronto Dominion Bank, Bank of Nova Scotia, Bank of Montreal and Canadian Imperial

Bank of Commerce. Levy and Hino (2016) evaluated the relationship between customers' emotional attachment towards bank service provider and card loyalty, as well as customer satisfaction.

Text Mining and Natural Language Processing

Text mining is a particular type of data mining focused on the handling of unstructured or semi-structured text documents. In the process of text mining, relevant words and relationships are extracted in order to categorize or draw conclusions. Some of possible text mining techniques include information extraction, topic detection, summarization, classification, concept linkage, information visualization, and question answering, keyword detection, named entity recognition, gender prediction, sentiment analysis, social network analysis, and others. Key-word detection aims to detect relevant keywords from any monolingual or bilingual corpus, using language-independent statistically based techniques, rule-based methods or hybrid approaches, as in Seljan et al. (2009a, 2009b, 2013, and 2017). Named Entity Recognition represents an important step in text mining (Saju and Shaja, 2017) used on large corpora, which can be used in Information Retrieval (IR), Information Extraction, further in Natural Language Processing (NLP), Machine Translation and Question-Answering System, Speech Recognition, Natural Language Generation, Chatbot conversation, Machine Learning, Image Recognition, and others. Nopp and Hanbury (2015) used sentiment analysis to detect risks in the banking system. Srivastava and Gopalkrishnan (2015) analyzed sentiments for the banking sector in order to assess the opinions on the functioning of the bank. Topic modeling or topic prediction/ extraction is based on number and distribution of terms across documents by counting the probability of belonging to a certain topic. Moro et al. (2015) performed topic detection of a large number of manuscripts using text-mining techniques when detecting terms belonging to business intelligence and banking domains.

Social network analysis (SNA) is a different type of analysis in comparison to text analysis, but it is used here to show how text analysis and its results can be integrated with this analysis. Morales et al. (2014) used SNA to estimate bank financial strength during the financial crisis.

Natural language processing (NLP) tools can help to extract and detect information relating to sentiment analysis on trust in banks, e.g. from Twitter posts or text from a newspaper article, can be used for predicting banks attitudes of clients towards the bank, and thus predict the potential business risks. Various consulting companies point out cases to acquire, develop and retain customers using sentiment analysis, in order to:

- analyze customer opinions (e.g., Barclays);
- develop 360-degree customer-view to predict future trends or ideas, as well as customer churn behavior (e.g., OCBC bank in Singapore, Bank of Austria, Tatra Bank);
- conduct customer segmentation in order to divide customers into groups that share similar characteristics (e.g., Bank of America, First Tennessee Bank);
- to improve marketing effects (e.g., by serving consumers according to lifestyle, professional life, families, and retirees, as for Singapore Citibank);
- to offer loyalty cards based on customer habits (e.g., Bank of America), as well to increase card usage (e.g., Barclays to target students), for the next best offer to predict future purchases (e.g., Westpac bank in Australia and New Zealand);
- to choose communication channel for interaction with customers ranging from mobile apps, social networks, clickable ads, stores, TV, publication platforms, and others, in order to provide

- preferred content through a preferred channel or to avoid undesirable ones (e.g., HDFC bank in India, OCBC bank in Singapore);
- to personalize customer experience on the chosen channel or preferred language (e.g., Bank of China), which would support the improvement of overall marketing effectiveness (e.g., Laurentian Bank of Canada).

Human-Computer Interaction

According to Saha (2017), banks are one of the first adopters of cutting-edge technologies, including human-computer interfaces which use natural language processing and speech recognition, connected with machine learning algorithms.

Researches and implementations of chatbots in the banking sector are often used as ‘live chat’. They access data and use artificial intelligence in the background to enable conversation and offer responses to customers. There are several possible uses of chatbots: to ask specific questions to consumers and, therefore, to collect data and learn customer preferences, or when integrated with machine learning solutions, to offer personalized products and offers via preferred mobile app, or to offer right content to the customer. Okuda and Shoda (2018) presented an artificial intelligence-based chatbot service, developed by Fujitsu, which aims to support users’ needs.

Another example of human-computer interaction is voice input, for information search, online communication or integrated with other technologies. Seljan and Dunder (2014) performed research on combined automatic speech recognition and machine translation in the domain of business correspondence. Voice-activated home banking is presented in Isobe, Morishima, Yoshitani, Koizumi, and Murakami (1996) with a success rate of 85%. Some banks use voice-recognition to check an account balance or to hear a payment-due date.

Due to security threats, banks are interested in risk prevention, where biometric technologies can apply. Banking use of selfies, fingerprints, facial recognition or voice biometrics, representing the new horizon, which enables users to enrol in banking services through smartphones or telephone banking. Piotrowska, Polasik, and Piotrowski (2017) concluded that authorization using fingerprint is secure and convenient for consumers in mobile banking.

Mobile Banking: Security and Gaming

Banks and financial institutions have to satisfy mobile banking customers with instant access, but at the same time protect customer information, transactions, banks’ data from any threats in order to ensure the highest level of security. According to Vasco Data Security (2016), nearly all Android apps (95%) were hacked in 2014 and the security issue has become the main concern of financial institutions. This is of highest concern since according to Global FinTech Survey (2016), where more than 90% banks expect the raise in usage of mobile applications and 71% believe that in the next five years more than 60% of clients will use mobile applications at least once a month to use financial services. Therefore, special attention is given to the *security* aspect in mobile applications. He, Tian, Shen, and Yaohang (2015) explored blog mining as a research method to analyze blog discussion on security of mobile applications and used the current technology to simulate the scenario of emerging attacks on banking applications. They identified the main protection strategies for users and developers of mobile banking apps. Alotaibi, Furnell, and Clarke (2016) studied risks for each process from the authentication within the mobile

application in order to understand various levels of risks. Hayikader, Hadi, Hanis, and Ibrahim (2016) examined issues of architecture and security issues on banking apps for everyday users.

Schaefer, Moormann, and Rosemann (2012) considered the concept of customer process to establish a customer-centric business model and presented the results of empirical research of smartphone apps for banking. The research pointed out a customer-centric approach which presented competitive advantage and important feature of the app where the customer could be present during the whole process which had a positive impact on trust, as well as value-added services. In this process, *gamification* can be used as the leverage to increase the quality of customer relationships. Torres-Toukoumidis and Marín-Mateos (2017) identified incorporation of game elements in the mobile application in the Spanish financial sector, using a sample of 38 mobile application of mobile banking, analyzing purpose, audience, technological strategy, play experience, and game mechanics. Results showed that the purpose of such applications was to enforce customer loyalty and expand influence on audience between 26-35, with technology strategy to adopt security and privacy systems and the meaning of gaming awards. Additionally, game experience was adopted in banking communication among Spanish banking entities. The research aimed to establish patterns for gamification in the banking sector, by measuring effects and effectiveness on clients and their communication.

CONCLUSION

The banking sector is strongly affected by the aforementioned disruptive technologies, challenging the traditional model, moving from purely monetary transactions to integrated financial experience which also includes technological, personal and social aspects. Use of new technologies requires specific attention given to security, privacy, data protection, and legal regulations. Banks offer new personalized approach and try to differentiate from others through customer-centric approach, effective use of technology and adapted business process. Data science combined with sophisticated analytic tools and computer power created new business opportunities.

Digital innovation is changing traditional small business banking. The continuous research of efficiency by the banks, along with the increasing demand of small business owners who are raising their expectations in their business banks, is pushing the transaction of banking institutions through digital solutions, also for small business clients. Banking is looking for ways to exploit digital innovation to support small business activities, solving their day-to-day problems and helping them to expand above their geographical border. Moreover, banks can often take advantage of the investments that have already been made in retail banking digital platform. As highlighted by Oliver Wyman in the report on European retail and SME credit, “banks that successfully digitize their SME offering can benefit enormously. In North America, Bank of Montreal and PNC claim significant increases in customer numbers as a result of online and mobile banking offers targeting small business owners”. Nevertheless, as resulted from the analysis of the previous section, there is again room for improvement regarding a digital proposition for SMEs. For this reason, this chapter provides an outlook to the possibilities that could arise from the digitization..

The chapter focuses on FinTech aided banking services, in particular, because these are, at present, the most widely FinTech technologies available in Italy. We presented a study about how Italian SMEs understand and use FinTech technologies, indicating that despite FinTech has entered in Italy only in recent times, the Italian SMEs market is very active and fruitful for digital companies.

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Chapter 16

FinTech for Digital Financial Services: The African Case

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ABSTRACT

The introduction of FinTech into Africa's digital financial services environment has provoked a controversy as to whether the innovative technology should be assimilated by banks and other financial service providers or not, thus creating uncertainty about the future of FinTech on the continent. This chapter, therefore, examines the issues, controversy, and problems surrounding the debut of FinTech and suggest ways to make the technology acceptable in order to harness its potentials for the overall benefit of the African society.

INTRODUCTION

In a competitive environment dominated by technology, the growth of modern business is closely linked with technological innovations. Betz (1998 p.23) described technological innovation as the invention of new technology and the development and introduction of the technology into the market place. Technological innovations comprised modified products and processes that improve on performance characteristics (OECD, 2002).

For businesses to thrive in this digital era there is need for such business entities to continue to innovate in order to deliver quality products and services to consumers as well as compete effectively in the industry. According to the Oslo manual, an innovation is defined as the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations (Eurostat and OECD, 2005). The Oslo manual further stated that the minimum requirement for an innovation is that the

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product, process, marketing method or organizational method must be new (or significantly improved) to the firm. Innovations activities are all scientific, technological, organizational, financial and commercial steps which actually, or are intended to lead to the implementation of innovations. Innovations activities also include Research and Development that is not directly related to the development of a specific innovation.

Shukla (2017), while defining innovation as exploiting new ideas leading to the creation of a new product, process or service said it is not just the invention of a new idea that is important, but it is actually, 'bringing it to market', putting into practice and exploiting it in a manner that leads to new products, services or system that add value or improve quality. According to him, innovation also means exploiting new technology and employing out-of-the-box thinking to generate new value and to bring about significant changes in society. Berry and Taggart (1994 p. 341) viewed innovation as the total process from the inception of an idea through to the manufacture of a product and finally, to its ultimate sale. They further added that innovation includes invention as the many stages of implementation such as research development, production and marketing.

It is obvious from the foregoing that innovation may have slightly different meanings depending on the industry but its core is universal. Jacob Beckley in an article he wrote for Business NewsDaily said innovation embodies the improvement of something that has come before and it is the evolution of convenience, efficiency and effectiveness. As the Fusion 92 vice president put it, the companies that do their best are the ones that will ultimately have sustained success:

In the vast sea of innovation, companies that take the largest risk, close the biggest gaps and identify the newest opportunities are rewarded with the title of true innovators and leaders by their consumers and peers. These true innovators are setting themselves apart from any and all competition (Business NewsDaily 2013, September 23).

Innovation helps businesses to stay ahead of the competition as the market and trend continue to shift. ImagineNation (2018) asserted that innovation enables businesses to achieve a range of key business outcomes including: (1) engaging and aspiring people to tap into the power of the internal crowd, and empower people to create, invent and innovate new products, processes and services; (2) increasing their return on investment (ROI) to shareholders; (3) achieving business growth goals and improving bottom line results; (4) increasing business value making the business attractive to shareholders, mergers and acquisitions; (5) making productivity and efficiency gains to increase profitability; (6) competing successfully to respond to industry disrupters, increase market share and extend product lifecycles; and (7) responding quickly by developing the internal capability in both human and technology resources to change direction and do things differently.

Businesses that are unable to innovate by recognizing their current resources, opportunities for development, response to customer or organizational needs and anticipation of future trends, run the risk of operating inefficiently (Innovation Xchange, 2018) as well as face decline and extinction. Technological innovations are therefore key enablers of businesses growth and development (Moore 2017; George, McGahan & Prabhu 2012).

One key innovative technology that is poised to revolutionize the financial services sector in Africa is Fintech. Simply put, Fintech is the application of innovative technology to financial services and dates back to the invention of double entry bookkeeping. However, since the turn of the century, the term has expanded and now presents a very valid challenge to traditional banking as an increasing number of

startups are providing services more efficiently and less expensively. Amid all the hype, Fintech is greatly reducing the cost of transferring money and giving hundreds of millions of people access to financial services for the very first time in the African continent.

The financial services sector consists of diverse group of companies that goes beyond banks and credit unions. Companies in the financial services industry are in the business of managing money. Globally, the financial services industry leads the world in terms of earnings and equity market capitalization. Large conglomerates dominate this sector, but it also includes a diverse range of smaller companies. Commercial banking services are the foundation of the financial services group (Investopedia, 2018a).

The digitalization of financial services is contributing to an expansion in offerings. For the past decade the financial services sector in sub-Saharan Africa, as with many other less developed markets has leveraged digital technology to help underserved clients interface with financial products and services from which they were previously excluded. For several years, there had been little product diversification beyond digital payments and transfers. Lately, however, the broader shift to digital is leading to more modes of engagement, tools and offerings and ultimately contributing to an expansion in the pool of use of cases.

Users are now able to interact with financial services via various digital channels of engagement. Modes of engagement range from the original USSD mobile money services, accessed through feature phones, to services accessible through smart phones applications and social messaging platforms. With 55% of sub-Sahara Africa's network connections predicted to come through smart phones by 2020 (MobileWorldLive, 2017) there is no doubt that the face of digital finance is changing. Increased smart phones adoption has led many local Fintechs (such as Branch, Tala) as well as banks and mobile network operators (such as Eazzy Bank, Tigo Pesa) to offer their services through applications either in conjunction with or as a substitute for a USSD service.

Undoubtedly, Fintech is the new buzzword sweeping across Africa. As with many new phrases that land on the shores of the African continent, there is enthusiasm to embrace it, partly in order to avoid being seen as behind the times. Yet, clearly, there is still considerable confusion about exactly what it is and where and for what purpose it can be applied. This chapter thus examines the future of Fintech in Africa's digital financial services environment. The objectives of the chapter are:

1. To find out the areas where Fintech can be applied effectively
2. To highlight the benefits and challenges of the new innovative technology
3. To ascertain why its acceptance is still shrouded in controversy
4. To come out with recommendations that would help to overcome the challenges and make Fintech acceptable in the African continent.

The next discussion will feature the following sections: background, main focus of the chapter (issues, controversies, and problems), solutions, recommendations, and conclusion.

BACKGROUND

Concept of Fintech

Fintech is a combination of the words “financial” and “technology”. It is a broad category that refers to the innovative use of technology in the design and delivery of financial services and products. The application of Fintech cuts across multiple business segments, including banking, insurance, investment management and payments, lending, advice and other areas related to finance. Many Fintech companies harness mobile technologies, big data and superior analytics to tailor products for various customer segments. Fintech is fast changing the way in which companies interact with their customers in today’s digital world. The proliferation of Fintech has had a number of positive impacts for society, including increased competition, a reduction in prices paid by customers and wider access to financial services among the traditionally underserved.

Fintech is defined differently in the literature. Researchers such as Sweeny (2015) cited in Ryu (2018 p.3864) and Kuo Chuen and Teo (2015) defined Fintech as products or services in financial service companies that were created on highly innovative and disruptive service technologies. Ernest and Young (2015) cited in Ryu (2018 p 3864) defined Fintech as an innovation in financial services where technology is the key enabler. Lee (2015) referred to Fintech as a type of business using hardware and software technologies to provide financial services. Amer, Barberis & Buckley (2015) also referred to Fintech as technology enabled financial solutions.

According to Kawai (2016 p.1) Fintech denotes companies or representatives of companies that combine financial services with modern, innovative technologies. Schueffel (2017 p.32) defined it as a new financial industry that applies technology to improve financial activities, while Sanicola (2017) described Fintech as the new applications, processes, products, or business models in the financial service industry, composed of one or more complementary services and provided as an end-to-end process via the internet. Accenture (2018a) averred that Fintech is all about applying evolving technological advances to improve financial services – either reinventing or simplifying a process, increasing its functionality and making it more engaging for user. The ‘tech’ in Fintech, as Accenture puts it, is the emergence of brand new technologies such as AI (Artificial Intelligence), blockchain, analytics and big data.

Blockchain represents the new economic revolution of the twenty first century with a vast possibility of its application in several areas of the economy such as finance, medicine, agriculture, insurance, voting system etc. (Okonji, 2018 p. 30). For African governments and businesses struggling under the weight of outdated administration techniques, overbearing bureaucracies, and competing asset ownership claims, the attractions of blockchain are obvious (African Business, 2018 February p. 14). Defined by Iansiti and Lakhani (2017) as “an open, distributed ledger that can record transactions between two parties efficiently and in verifiable and permanent way”, blockchain allows contracts to be embedded in code and “stored in transparent, shared data bases, where they are protected from deletion, tampering, and revision”.

Although Fintech is generally seen as an economic industry composed of companies that use technology to make financial services more efficient, it encompasses companies that simply provide the technology (such as software solutions) to financial service providers (Dorfleitner, Weber, Schmitt & Hormuf, 2017 p.5).

FinTech for Digital Financial Services

Contrary to popular belief, Fintech is not new. It has been around in one form or another virtually as long as the financial services industry itself. After the global financial crisis of 2008, however, Fintech has evolved to disrupt and reshape commerce, payments, investment, asset management, insurance, clearance and settlement of securities and even money itself with cryptocurrencies such as Bitcoin. In the last few years, Fintech companies have defined the direction, shape, and pace of change across almost every financial services subsector. Customers now expect seamless digital onboarding, rapid loan approvals, and free person-to-person payments – all innovations that Fintech made popular. And while they may not dominate the industry today, Fintechs have succeeded as both stand alone businesses and vital links in the financial services value chain (World Economic Forum, 2017).

According to World Economic Forum (2017), disruptive forces that have reshaped the Fintech industry include, but are certainly not limited to:

1. The growth of online shopping, which is expanding quickly at the expense of in-person shopping, leading to the dominance of online, cashless solutions for transactions.
2. A shifting balance of power that swings from banks and other financial services to those who own the customer experience. Banks are eliminating in-person services and looking to Fintech and large technology companies for other ways to engage customers.
3. New trading platforms that are collecting data to create an aggregated market view and using analytics to uncover trends.
4. Insurance products, which are becoming more tailored to customers who, in turn, are demanding coverage for specific locations, uses and timeframes. That is driving insurers to collect and analyze additional data about their clients.
5. Artificial intelligence, which now plays a role in differentiating financial services products as it replaces complex human activities.
6. Transaction process improvement and middle ware, both of which remain expensive. This is pushing traditional financial services firms to consider partnership with market place lenders for Fintech solutions that do not require a full infrastructure overhaul.

The rise of Fintech has changed the world's business landscape. Fintech companies are now directly competing with banks in most areas of the financial sector to sell financial services and solutions to customers (Chima, 2017 p. 27). Mostly due to regulatory reasons and their internal structures, banks still struggle to keep up with Fintech startups in terms of innovation speed. Fintechs have realized that financial services of all kinds - including money transfer, lending, investing, payments etc - need to seamlessly integrate in the lives of the tech-savvy and sophisticated customers of today to stay relevant in a world where business and private life have become increasingly digitalized.

Fintech and the Business World

Once thought to be unfailingly secure due to their size, scope, influence and the high barriers to market entry, banks, insurance companies and investment houses have come under assault from a new technological wave that threatens their status quo, if not their existence. Fintech is said to be moving at such a rapid pace that, by 2020 as much as 25% of the financial industry's revenue will be at risk. According to a PriceWaterHouseCoopers' (PWC) report titled: "Financial Services Technology 2020 and Beyond", the convergence of financial services and technology, which has come to be known as Fintech, has become

such a disruptive force in such a short time period that established financial institutions must quickly reconsider their business models or risk obsolescence in significant parts of the financial services value chain (Investopedia, 2018b).

There is no doubt that Fintech has changed the world of finance for customers in a myriad of ways. Customers can now open a bank account over the internet without physically visiting the bank. They can link the account to their smartphone and use it to monitor their transactions. They can as well turn the smartphone into a ‘digital wallet’ and use it to pay for things using money in the account. Fintech is also rapidly changing the insurance and investment industries, car insurance providers now sell ‘telematics-based’ insurance where driving is monitored using data collected via a smart phone or a ‘black box’ fitted in one’s car. This data can then be used to determine how much is paid for an insurance policy. In the future, it may be possible to buy insurance on a short-term or ‘pay as you go’ basis.

As an innovative and emerging field, Fintech has attracted public attention and growing investment (Ryu, 2018 p. 3864). According to an Accenture report titled “The Future of Fintech and Banking Digitally Disrupted or Reimagined?” global investment into Fintech companies and startups have risen dramatically from \$930m in 2008 to over \$12billion by the beginning of 2015. Europe experienced the highest growth rate, with an increase of 215% to \$1.48billion in 2014 (Accenture 2018b). This figure is likely to increase tremendously in the years ahead.

Fintech and Africa’s Emerging Market

Africa is a vast continent with diverse economies and a total population growth of 1.2 billion people living in 54 independent countries spread over 30 million square kilometers. As a market, the continent has all the prerequisites to serve as a firm foundation for growth and development. Among the key data points characterizing Africa’s state of financial system, the SWIFT Institute (2017) has outlined the following:

1. In 47 out of the 89 markets where mobile money is available, both banks and nonbanks are allowed to provide mobile money service.
2. Half of almost 300 million registered mobile money accounts globally are located in sub-Saharan Africa.
3. In addition, there are 226 million mobile money agents in developing countries around the world, many more than the number of alternative financial access points comprising ATMs (1.38 million), commercial bank branches (524,000), post offices (501,00) and Western Union locations (500,000).

As at the end of 2017, there were more than 300 Fintech African startups across the continent. Disrupt Africa’s innovating for Africa: Exploring the Fintech startup Ecosystem Report 2017 concludes that African startups’ growth since 2015 has been nothing short of tremendous. Mulligan (2017) notes:

With so many of Africa’s citizens still without access to basic financial services the work being done by the continent’s Fintech innovations is of crucial importance and impact. We are glad to report such thriving activity among Africa’s Fintech community, and believe these local entrepreneurs are creating a new model for financial services – and financial inclusion – in Africa.

FinTech for Digital Financial Services

The record shows over US \$100 million in Fintech funding has been secured across the continent over the last two years, with South Africa, receiving 34.2 percent of the total and Nigeria following closely with 34 percent. South Africa has the most Fintech Startups with 94, followed by Nigeria with 74 and Kenya 56. Oladeji (2018) identify the following as the factors and drivers behind the growth of Fintech in Africa's emerging market.

Payment Made Easy

Fintech has made payments and remittances more convenient across the continent. Most traditional banks are located in cities and commercial areas, making them difficult to access from remote areas. Tanzania, for example, has about 50 million people sparsely distributed across an area nearly four times the size of the United Kingdom. In Nigeria, banks used to be packed with customers queuing to pay their utility and Cable TV bills, school fees and so on. It could take hours to make a simple transaction.

In 2012, a cashless policy was introduced by the Central Bank of Nigeria to curb excess handling of cash and reduce the volume of money in circulation. The policy has facilitated many Nigerian Fintech startups' market penetration and expansion. Customer transportation costs, waiting times and the loss risks attached to cash have been eliminated by the smartphone-based Fintech services provided by these startups. About 100 of Africa's Fintech startups are focused on streamlining money transfers. According to Tayo Ovosu, founder and CEO of Nigerian mobile payment platform Paga, "Nigerian banks have traditionally focused on retail. Paga has built the single largest network of financial access points in Nigeria. We are going to leverage that to deliver financial services to the mass market".

Market Confidence

One of the significant drivers of African Fintech startups is high confidence in the market. Early Fintech startups demonstrated that the market is strong, and the growth trend has continued, attracting Silicon Valley-based accelerators. Fintech startup funding is presently one of the most attractive investments on the continent. In 2017, over 30% of the US \$195 million in VC funding raised by Africa startups went to the Fintech sector. Safaricom's M-Pesa mobile money service has had a great impact in Kenya, and Nigeria's Paga, South Africa's Zoono, Kenya's BitPesa and others across the continent are garnering increased funding as investors become more confident.

Influencing the Traditional Banking System

Since the inception of Fintech, there have been dramatic changes in the continent's traditional banking system. Banks and financial institutions are under pressure to match the innovative solutions and services being offered by Fintech startups which have reached millions of people who have mobile phones but not bank accounts. Now, banks and financial institutions are introducing a variety of strategies and tactics to invest in, acquire or collaborate with Fintech startups. This is a trend that is expected to continue.

More Africans Connected to the Internet

Nigeria, South Africa, Egypt, Ethiopia and Kenya are among the most significant mobile markets in Africa. Although 80 million Nigerians – 47 percent of the population do not have bank account, 142 mil-

lion Nigerians have mobile network access and 103 million are internet users, according to the regulator of the telecommunications industry, Nigerian Communication Commission (NCC).

The penetration of mobile phones and the internet has enabled Fintech to influence how financial services and products are developed and delivered, as more Africans plug into digital financial services across the continent. Kenya's M-Pesa is being used by more than half of the country's adult population, and has recorded transactions worth more than half the country's GDP since its debut. Similar success stories have been told by the likes of South African startup Zoono, Nigeria's Paga and others.

Filling the Vacuum

A World Bank report notes that Nigeria, like many countries in sub-Saharan Africa, has a growing population that lacks easy access to traditional financial services and Fintech innovators are filling the vacuum by connecting these people. This differs from the situation in advanced economies with strong financial institutions, where Fintech startups are cast instead as disrupting the traditional banking industry. For example, China's Wechat is a popular messaging app with a wallet feature that enables users to send and receive money, make payments and so on from within the Wechat app, without connecting to a bank account for many transactions.

Competition and Regulations

Among the factors responsible for African Fintech growth are strong competition and loose regulations. Presently across the continent, there are few or no strict regulations compared to advanced economies. Startups can operate relatively tax-free and with less government interference, leaving them to chart their courses and develop their products with little regulatory interference.

There is also increasing integration from service providers, many of which are partnering with Fintech startups to make transactions more convenient for customers. For example, Cable TV companies such as DSTV, HiTV, and TSTV have introduced Fintech alternatives to their traditional bank payment models. As more banks and financial institutions acquire or partner with Fintech startups, the trend is being seen not so much as financial industry competition but as industry reinvention that has improved financial service companies' profiles, reach and products and services; and is beneficial to banks, startups and customers alike. Fintech has thus become one of the most vibrant investment options in the African tech space.

Going Forward

In recent years, African Fintech Start-ups have been outperforming banks in delivering digital financial services. Iyin Aboyeji, Chief Executive of digital payment technology startup flutterwave, describes Fintech as a financial element that will drive the digital economy in Africa over the coming years. Investors and companies are expected to get even more involved in African Fintech market because the opportunities are tremendous.

Fintech Ecosystem in Africa

Since the Fintech startup boom began in earnest in 2015, the Disrupt Africa's Finnovating for Africa research found that the continent's Fintech startups have secured millions of dollars in investment. While

the payments and remittances, and lending and financing subsectors saw the highest values of investment secured, a novel trend uncovered by the data is that blockchain startups have proven the most likely group of startups to raise external funding – with 38.9 percent of Africa’s blockchain startups securing funding since the beginning of 2015. This points to the fact that investors are drawn both to startups busy addressing the lack of basic financial services on a local level, as well as those innovating around globally relevant cutting-edge technologies.

Reflecting on the vibrancy of Fintech in Africa’s ecosystem, Tom Jackson, co-founder of Disrupt Africa enthused:

Fintech is clearly a vibrant space with the African tech scene, perhaps the most vibrant of all. Increasingly, investors are seeking the huge potential the space has to offer. We hope this report will provide valuable insights and leads to both, startups and funders in space, and contribute to the evolution of the sector for the benefits of all.

MAIN FOCUS OF THE CHAPTER

Issues, Controversies, and Problems

Issues

The debut of Fintech in the financial services sector in Africa has led to the introduction of startups and innovative solutions by Fintech companies. These startups and solutions deployed by the Fintech companies are disrupting existing financial services as well as creating opportunities for many who were hitherto not served by the banks and other financial institutions. As a result, the Fintech companies are considered a threat to the existence of most banks. The threat, identified as real has continued to engender fear amongst stakeholders (policy makers, professionals, and employees) in the financial industry.

Echoes of the fear resounded recently in Lagos, Nigeria when the Central Bank Governor, Mr. Godwin Emefiele admitted that Fintech companies pose a big threat to the banking industry. Emefiele raised the alarm at the investiture of Mr. Uche Messiah Olowu as the 20th President and Chairman of Council of the Chartered Institute of Bankers of Nigeria. While calling on bankers to urgently address the threats posed by Fintech companies, he urged the CIBN to embark on advocacy campaign to avoid crisis in the financial sector. Immediate past president of CIBN, Mr. Segun Ajibola also admitted that banks face huge threats from Fintech companies (Asu, 2018).

The fears and worry over the negative impact of Fintech on the financial services sector show how disturbing the situation could be in all the countries where the innovative technology has made remarkable progress in driving the exponential growth in digital payment. Threatened by disruption from Fintech companies, and the fear of being obsolete in the years ahead, African banks have been on the forefront of collaboration between startups and corporates.

Controversies

Since the emergence of Fintech in Africa’s digital financial space, established players (banks and other financial companies) are in a quandary as to whether to compete by adopting the new technology or stick

to what they know best. While some are urging them to assimilate Fintech and deploy it appropriately for the benefit of society, others want the banks and other companies to either fight or tread softly.

Reflecting on the dilemma faced by the established players in the financial services sector, the Bank of England's Governor, Mark Carney warned that competition offered by Fintech could reduce the stability of funding of incumbent banks. He added that the challenge for policy makers is to ensure that Fintech develops in a way that maximizes the opportunities and minimizes the risks for society. Ford (2017 p.20) noted that while it can be difficult for mainstream banks to replicate the services offered by Fintech operators at similarly low cost, mobile money firms can usually provide alternative versions of the products offered by traditional banks. For example, M-Pesa now allows customers to save for a specific purpose via its M-Shwari service, replicating similar savings accounts offered by high street banks that enable customers to buy a car, pay school fees or meet other specific outlays.

Global consultancy Accenture calculates that Fintech threatens more than a third of traditional bank's revenue due to the march of technological innovation and the emergence of more attractive investment regimes, the challenge posed by Fintech is only likely to grow. The Chief Executive Officer of cloud banking services Mambu, Eugene Danilkis, commented that: "Africa is in the early but rapid phases of Fintech development. Having started off on the payments side, it will move quickly and leapfrog to more complex financial service as smart phones penetration deepens. There is a big opportunity for extensive growth with a population of 1.2bn, which will double over the next 30 years" (Ford, 2017 p.20).

However, Dave Van Niekerk, the CEO of MyBucks, said it is hard for traditional banks to change traditional operations because it is not viable for them to offer accounts with very small balances to millions of people. He added that in the very near future, the poorest of the poor will use technology to educate themselves and access financial products and services, anywhere and at any time. In view of the many challenges posed by Fintech to the financial services sector in Africa, the banks and financial companies must therefore decide whether to defend its position or evolve in line with market trends.

Problems

The financial service sector in Africa has grown to be one of the most popular for technology innovations. Today, all eyes are now fixed on the sector globally, and the changes that are set to occur in the nearest future. Across Africa, more and more Fintech companies are innovating, putting the continent on the global landscape. These companies leverage technology to provide innovative financial service, including payment, lending, savings, financial advice and financial infrastructure, resulting in greater efficiency, better service and lower costs (CPAFRICA, 2018).

In the words of Phillippe Gelis, CEO of Kantox, "Fintech is changing the finance sector just like the internet changed the written press and the music industries". The words of Gelis aptly describe the rate at which Fintech has grown in the last few years, changing the traditional financial service sector we used to know, and impacting how increasing numbers of individuals and businesses alike conduct their financial transactions (CPAFRICA, 2018).

One of the biggest problems of the innovative technology (Fintech) is the lack of interoperability between the various services and mobile operators in different countries. Until recently, while Kenyans living abroad were able to transfer money to family and friends at home via M-Pesa, it was more difficult for Kenyans to send money to people living in other African countries.

However, cooperation and interoperability agreements are being concluded between different mobile and platform operators, Vodafone, which partly owns M-Pesa, and MTN group signed a deal in early

2015 that allowed their customers to transfer money between the two networks. Some weeks later, the British company concluded another agreement that allowed M-Pesa to transfer to seven African countries via Vodafone's network. Other mobile operators were forced to follow Vodafone's lead. East Africa has been at the forefront of this trend as Central banks and telecoms regulators in the region have required operators to allow transfer between platforms (Nelson, 2017 p.25).

Solutions

In spite of the threat it poses to banks and financial service providers, it is instructive to note that Fintech has become the next big thing in Africa. In the next few years, going by the way it is disrupting traditional processes, it would take over the financial service sector in the continent. In view of the prospect Fintech holds for Africa's financial industry, the following solutions are hereby proposed to address the issues raised in this work.

1. In order to harness the benefits of Fintech for the growth and development of the financial service sector in Africa, established banks should assimilate the innovative technology rather than fight it.
2. For the financial sector to achieve maximum growth in this digital age, banks and other financial service providers should collaborate with Fintech companies and take advantage of the numerous opportunities it presents to improve their traditional offerings.
3. Companies in the financial service sector and outside hoping to flourish should also leverage the potential of Fintech by having a top-down approach, embracing new technologies in every aspect of their businesses, shifting their thinking to better meet customer needs, constantly tracking technological developments and integrating digitalization into their activities.

Recommendations

Based on the issues, controversies and problems presented in this chapter, the following recommendations are made.

1. There is no doubt that the emergence of Fintech companies pose serious challenges to banks and the traditional payment methods. In view of this, banks are therefore, encouraged to become equally innovative to compete effectively with the new entrants.
2. Established banks and other financial institutions should position themselves to take advantage of the tide of financial technological innovations in Africa.
3. E-payment providers who are worried by the emergence of disruptive technologies like Fintech should rather focus on how to use them to add value to their services and the financial ecosystem.
4. Established banks should seek to compete with Fintech companies by becoming incubators for the innovative technology. Banks like Standard Bank and Barclays have both launched startup support program with the most successful companies taken under their wings at the end of the periods of supports.
5. Established banks should seek out Fintech startups that fit into their existing corporate, technological and business systems rather than opting for those that are truly disruptive in nature.
6. Established banks and mobile network operators in Africa should work together to promote interoperability to ease the transfer of money within the continent, as well as between platforms.

7. Fintech companies should reach out to low income earners and people in the rural areas in order to boost economic growth and increase the Gross Domestic Products (GDP) of African countries.
8. The Fintech companies should also play important role in the development of the economy and the promotion of financial inclusion in Africa.
9. Lastly, there is a need for constant dialogue between all stakeholders in the financial service sector so that the current obstacles to the adoption and use of Fintech could be removed.

FUTURE RESEARCH DIRECTIONS

Technology has no doubt changed the way the world works and communicates. In this digital age where almost everything is leveraged by technology, more and more disruptive technologies are being introduced into various world ecosystems to ease the conduct of business, reach more people and provide them with exciting opportunities to enhance their wellbeing. Fintech is one of such technologies that is constantly disrupting the way things are being done in the financial service sector in Africa.

This chapter discusses the future of Fintech in Africa's digital financial services environment. It aligns with the title of the book which has to do with Fintech as a disruptive technology for financial institutions. The model which captures the essence of this work is the technological innovation model. Pratali (2003) averred that the application of technological innovation to processes or products yields a strategic weight that enables decision makers to evaluate the increase in business value.

Pratali's technological innovation model is composed of four sub-models: the first is an analysis of process/ product competitiveness aimed at identifying competitive priorities and therefore appropriate technologies; the second sub-model identifies the priorities of technological intervention from amongst the competitive technologies selected; the third sub-model correlates the two previous models and thereby expresses "strategic weight" of the technological projects with respect to the competitive priorities of the processes or products; the fourth and the last sub-model applies scenario simulation and sustainable growth verification to estimate the impact of strategic project innovation in terms of increased business value.

As the technology spreads one would expect the key players in the financial service sector to embrace and utilize the various genuine Fintech startups and solutions for the overall benefit of the African society. Banks and other financial service providers' readiness to assimilate the innovative technology will help promote financial inclusion and ultimately determine the future of Fintech in the continent. The level of compliance in the adoption and use of Fintech in individual countries and how businesses benefit from it will likely form the nucleus of future research in this domain.

CONCLUSION

Despite the fears expressed by key players about the negative impact of Fintech on the financial service sector of the African economy, the innovative technology offers several advantages that far surpass the challenges it pose to banks and other financial institutions. It is glad to note that it can be cheaper to operate and more efficient in terms of manpower, money and data, and it can more easily reach those currently without access to financial services. Fintech is also credited with cutting remittance costs to a fraction.

Consultants Mckinsey has revealed that about 2,455m people around the world – or 53% of the global adult population – do not use any financial institution. An incredible 78% of all adult Africans lack ac-

cess to bank services. Yet at the same time, there are 220m registered mobile money accounts on the continent, more than in the rest of the world put together.

M-Pesa and similar services allow users to send and receive money from anywhere with a mobile signal via a mobile handset and at far lower cost than by traditional banks and money transfer services. Most customers want just four services: banking, borrowing, money transfer and insurance, so platforms can be fairly simple, relying on access to mobile phones. The proportion of adults with mobile phones is roughly the same in Nigeria and the US, although smart phone penetration is more advanced in the latter.

However, Fintech developer MyBucks gets around even the lack of mobile technology by offering customers a basic mobile handset as part of its package.

Fintechs, as the Director Non Traditional channels West Africa, Mastercard, Uwa Uzebu noted are one of the forces driving digital payment. Digital payments in 2015 alone accounted for eight percent of total global retail payment of \$16 trillion and it is projected to grow to 24 percent in 2020 when global retail payments would have increased to \$21 trillion. The number of Fintech startups has tripled and funding has grown seven times over the last decade.

The payment industry has recently witnessed the entry of diverse non bank digital players – both technology giants and startups who are presenting increased competition for banks. While these categories of entrants have generally not been major threats to the banking and payments industry in the past, the aggressive nature of the digital players, the prominence of smart phones as a channel and rapidly evolving customer expectations have all made a difference in recent past. To maintain customer relationships and stay relevant, there is need for all stakeholders to respond to these changes with new strategies, capabilities and operating models.

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KEY TERMS AND DEFINITIONS

Business Ecosystem: Is a network of interlink companies such as suppliers and distributors, who interact with each other, primarily complementing or supplying key components of the value propositions with their products or services.

Digital Payment: Is a way of paying for services or goods via an electronic medium without the use of cash or check. It is also known as electronic payment system or e-payment.

Disruptive Technology: This refers to any enhanced or completely new technology that replaces and disrupts an existing technology, rendering it obsolete.

Financial Service Providers: They are financial institutions that provide services to consumers. The most typical of the service providers are banks, payment providers, insurers, receivables managers, intermediaries, funds and investment fund.

Fintech Companies: They consist of both startups and established financial technology companies trying to replace or enhance the usage of financial services provided by existing financial companies.

Innovative Technology: Is a technology that is newly invented or is being utilized in new ways.

Mobile Network Operator: Is a telecoms entity that provides services for mobile phone subscribers.

Remittance: Is the funds a foreign worker sends to his or her country of origin via wire, mail or online transfer.

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Chapter 17

Fintech Ecosystem and Banking: The Case of Turkey

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ABSTRACT

In this study, Fintech platforms are compared to the traditional banking system. This comparison is based on the banking activities offered by Fintech platforms and the results of these activities. In the study, firstly, a general evaluation is made in the comparison of the Fintech platforms to the banking system and then the situation in Turkey is analyzed. It is clear that Fintech platforms have developed financial markets. Moreover, banks have the potential to adapt to the digital innovation advantage of Fintech platforms. In this study, the banking system and Fintech platforms are considered as competing institutions as well as supporting and transforming each other. Services within the scope of banking activities change as a result of digital innovations. As a result, it is clear that the financing system enters into a revolutionary process. This study contributes to the literature in terms of the analysis of the relationship between banking and Fintech, which is based on Turkish Fintech Ecosystem.

INTRODUCTION

Banking activities, which can be seen as one of the most important actors in the financial markets, have started to differentiate significantly from the 80s. Banking activities have made changes in both deposit collection and funding transactions. The reasons for these changes can be counted as follows: i) increasing risks in the financial markets, especially the exchange risk, ii) rise of competition, iii) deregulation of capital movements and iv) revolutionary movement taken place in technology.

Increasing risks in financial markets allowed new financial products to enter the system. Because the increased risk pressure in the markets led investors to tools such as financial derivatives to hedge the risks. How much these instruments protect investors from risk has become debatable after the global financial crisis.

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One of the reasons for the increase in risk in the banking system is that many banks operating on a national level have started to operate on an international level since the 80s. This led to the acquisition of international competitors by local banks. Thus, banks have been forced to manage a global fund flow as well as to fight a global risk wave. Banks that do not operate at the international level try to stay in this race with limited funds.

The start of international activities of local banks was realized by the liberalization of capital movements. The abolition of barriers to capital has made a big effect, not only on the banking system but also on the entire financial system. Developing countries such as Turkey thus faced more systematically with concepts such as the stock market and capital market. The abolition of barriers to the foreign exchange regime has improved trade and expanded the banking system's activity. For example, there were major restrictions on foreign exchange transactions in Turkey until 1983. Although liberalization of capital movements improved the banking system, it also significantly increased the risks.

Technological innovation is perhaps the most important driving force of the financial system and therefore the change in the banking sector. Since the 80s, the changes taken place in technology have enabled information to be obtained quickly. Banking activities were also greatly influenced by technological innovations. Banking activities and the way these activities are carried out have rapidly moved away from being staff oriented. Banks continue to use technology in a growing number of major business areas, such as accepting deposits, crediting and credit rating.

Changes in technological innovations have created extraordinary effects in many different sectors. For example, communication activities have been differentiated by many companies, such as Yahoo, Hotmail, and Google. In the same way, users have been able to create their own media through channels like YouTube. This also applies to retail companies. No matter what sector, companies have to design their activities according to technological changes. For example, the publicly supported PTT company, which has an important place in the communication sector in Turkey, had to establish the PTTCell brand as a mobile phone line. The same applies to other sectors.

This rapid transformation in technology has evolved into the Industry 4.0 process. According to Industry 4.0, information coming from the market will be included in the decision-making process through intelligent robots (Türkmen, 2018: 275). From a financial point of view, this means that financial decisions will be made by intelligent robots. Intelligent robots will collect information from the market fastly and then process this information very quickly.

The changes in the field of technology have also had a challenging effect on the banking sector. As a result of this compelling effect, Fintech has emerged, which are performing some of the banking activities. The emergence of Fintech has been realized at the end of a series of evolutionary processes in the field of technology. Electronic commerce and e-business technologies are developing digital technologies that bring out Fintech platforms (Gimpel et al., 2018: 245).

The World Economic Forum defines the concept of Fintech as institutions that will demolish traditional financial institutions equipped with destructive, revolutionary and digital weapons (World Economic Forum, 2017). This definition contains striking claims. Perhaps the most important of these claims is that Fintech is defined as organizations that break down traditional financial institutions.

Fintechs are more softly described as the acquisition of financial services and products through the use of digital technologies. According to the Financial Stability Board Fintech, new business models, applications, processes or financial markets and institutions and financial services have a significant effect on the presentation of products that may result in a technologically effective financial innovation (<http://www.fsb.org/work-of-the-fsb/policy-development/additional-policy-areas/monitoring-of-fintech/>,

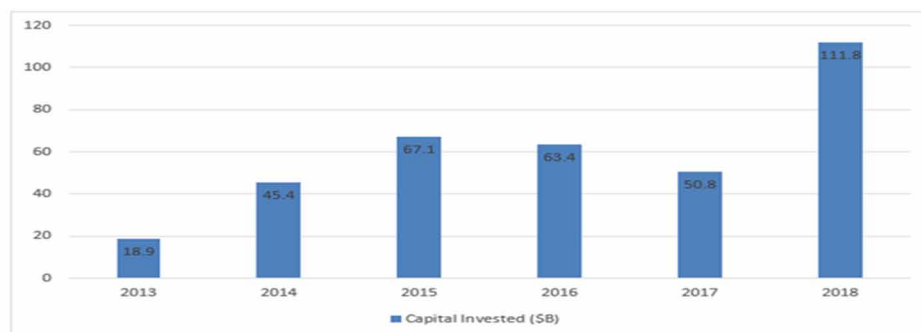
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15/03/2019). Despite this importance of Fintech platforms, we see that our knowledge of this subject is still very limited (Cai, 2018: 986).

In the definition made by the Financial Stability Board, the concept of “new business model” draws attention. Fintech platforms use a business model that is different from the business models used by traditional banks. This business model is based on customer focus. Fintech platforms have designed a digital-based business model that takes customers to the center especially in terms of payment and lending services (Anagnostopoulos, 2018: 10).

Figure 1. Capital invested (\$B)

Source: *Pulse of Fintech 2018, Global Analysis of Investment in Fintech, KPMG International (data provided by PitchBook) January 4, 2019.*



Source: Pulse of Fintech 2018, Global Analysis of Investment in Fintech, KPMG International (data provided by PitchBook) January 4, 2019.

Figure 1 shows the Fintech investments in the world between 2013-2018. According to the graph, Fintech’s investments increased to \$ 111.8 billion in 2018, compared to \$ 18.9 billion in 2013. This shows that the Fintech investments in the world are expanding with great acceleration. The increase in the services offered by Fintech platforms is one of the most important reasons for this development.

Fintech’s main objective is to provide consumers with new products through digital technologies at the lowest cost. For this reason, Fintechs are interested in all kinds of institutions, activities, and processes in finance where digital technologies can transform. However, the field of application the Fintechs; i) operational activities, ii) fund management and iii) we can generalize it as insurance. Fintech innovation areas in specific to Turkey; a) back-office operations, b) digital banking, c) e-commerce, d) identity management, e) payments and f) it could be counted as an insurance business (Deloitte Turkey, Fintech Ecosystem Report, 2017).

The increase in the popularity of Fintech platforms in the fields of activity mentioned above was due to the global financial crisis. The legal and institutional situation, especially changing from country to country, has been effective in the size of Fintech activities. Fintech platforms have created access to capital, especially to new companies. While implementing these activities, the most important advantage of these new institutions seems to be technological innovations.

Banks can be considered immensely successful institutions in adapting to technological innovations. However, Fintechs can offer some of their bank activities to its customers at a faster and lower cost, at least for the time being. The digital platforms of Fintech are also expanding customer pools. However, the fact that Fintechs are not subject to certain regulations, the competition seems to be a distorting factor.

Fintechs are platforms that perform the activities of banks in a different way. This different method has emerged as a result of digital innovative developments. As a result of this different method, Fintech activities are based on short-term relationships, activities are carried out over a digital network, the debtor-creditor relationship is established without intermediaries, and therefore risk-maturity adjustments are not made. Here in terms of Fintech customers, there is more risk is emerging than according to bank customers. This situation, especially in countries with high market fluctuation and fragility, such as Turkey, it restricts the activity areas of Fintechs.

Fintech's outstanding banking-related activities are crowdfunding and payment systems. Crowdfunding platforms combine account owners and funding need. Therefore, they convert savings like banks into credit and investments. As another Fintech activity, payment systems are realized with the support of banks. For example, the PayTR company in Turkey is Fintech which performs payment activities. Fintech contractually works with many banks such as Ziraat Bank, Akbank and İş Bank. At the same time, many payment systems, such as Visa, Troy and Mastercard, partner with the program and receive support. Here, banks support Fintech activities because they have lost some of their income but have developed their customer portfolios.

The fact that banks offer many services together, such as crowdfunding and Payment Systems, provides a significant competitive advantage. Bringing these activities together requires a stronger economic structure. From this point of view, it seems impossible for Fintech to compete in the banking system with limited activities only in the short term. However, Fintechs may be a “coercion” to the traditional banking system if they can bring together certain services (Navaretti et al., 2017: 11).

On the other hand, as Fintechs become compatible with the banking system, they can lose a significant portion of the cost advantage. Fintechs may lose their competitive advantage if they start operating within the framework of the regulations to which banks are subject. For this reason, Fintechs stand out in countries where banking regulations are more stringent. The possibility of Fintechs being subject to banking regulations could create serious obstacles to the activity. On the other hand, the regulations regarding the activities of Fintech platforms have a positive effect on the risk perception of the customers. In other words, the activities of Fintech platforms are considered to be less risky as regulations increase.

It is well known that there are some disadvantages of the banks presenting financial products and services in packages. Banks may not be able to specialize in any of these services compared to Fintech. At the same time, banks may not be able to offer personalized products because they identify standard business processes. In addition, the Fintech platforms are capable of providing the services they are experts in 7/24 (Anagnostopoulos, 2018: 10).

Although Fintech platforms operate in some developing countries, it rapidly spreads its activities in specially developed countries. However, the digital platform called M-Pesa in Kenya and the Digital India platform in India show that Fintechs are rapidly spreading in developing countries (Bapat, 2018: 210).

All in the circumstances, it is clear that Fintechs will have a significant impact on banking operations. This situation is seen as a “revolutionary” especially for a sector whose entry conditions are very difficult. However, as mentioned earlier, banks have a high capacity to respond to technological innovation. Therefore, banks are going to take advantage of more digital technology to protect themselves. This competitive environment increases the tendency of both Fintechs and banks to converge in their operations (Drasch et al., 2018: 36).

In the next part of the study, Fintechs and the banking system will be compared in terms of actual and potential joint activities. Then, Fintech activities and banking activities will be analyzed in terms of their basic outputs. In the final part of the study, information about the Turkish Fintech Ecosystem will be

given. The aim of this study is to determine the effects of digital innovations on the banking system and evaluate the results of these effects in Turkey. The contribution of the study to the literature is to present the opportunities and risks of the banking and Fintech system on the basis of the situation in Turkey.

FINTECHS AND BANKING ACTIVITIES

In the field of individual and institutional banking, financial services are provided, while technological innovations are increasingly utilized. These financial services include new market segments, channels, and products, payment methods, digital credit, and reporting (Anagnostopoulos, 2018: 8). Fintechs are seen as a digital platform that makes banking activities in different ways. Banking activities are based on two principles. These: i) collection of the deposit, ii) and credit. Banks have to take certain actions in order to carry out these activities.

First of all, banks perform the transformation of financial assets and liabilities. Banks convert their short-term funds to meet their long-term loan needs. With this process, depositors will transfer liquidity risk to banks by short-term funding rather than providing long-term loans. Those in need of financing have provided long-term funding for their investments.

Secondly, as a result of this activity, banks have specialized in providing payment services to their customers. Banks provide payment services to their customers for repayment of the loans they offer. Some of them are in the form of collecting long-term loans while others are in the form of debt recovery of credit cards. Nowadays, Fintech is trying to take over these functions of banks. But since this requires expertise and great economic power, Fintech generally performs payment services with the support of the banks (Alt et al., 2018: 237).

Finally, banks are institutions that specialize in collecting and processing information. In this way, they collect a variety of information about their customers. This information relates to the client's behavior, financial preferences, debt discharging solvency and risk-return preference. This information requires a very big database and cost. It is a matter of debate whether the Fintechs have the ability to make a large organization on this scale (Navaretti et al., 2017: 13).

Fintech platforms offer the services offered by banks in the form of high added value products. In this situation, financial products and services, as in derivative products, "financial function separations" has been performed. In this way, the existing risks of financial products and services can be separated. Behind this success of Fintech companies are innovations in information and communication technologies that significantly reduce costs (Nomakuchi, 2018: 3).

As mentioned above, banks have the capacity to present all these services simultaneously and in combination with the scope economies. This is the reason why banks exist. In order to analyse whether Fintechs can perform these banking activities, basic banking services should be examined individually in this section.

Risk and Maturity Transformation Function

As explained above, the basis of the banking activities is to change the characteristics of financial assets through maturity conversion. While performing this function, banks are primarily based on short-term funds collected from depositors. They convert these funds into loans for those in need of long-term fi-

nancing by allocating a certain provision. Another benefit of this service is that banks protect depositors against possible liquidity shocks.

When banks convert short-term deposits into long-term loans, they remove their responsibilities on the amounts that Deposit owners refer to investment. Fintech platforms make a peer-to-peer matching with crowdfunding activities. Therefore, these platforms do not take risks in the debt relationship. Thus, the risk of depositors increases. However, the Fintech platforms, especially as the number of branches of the bank continues to decline, increase their effectiveness in the unsecured consumer loans market (Jagtiani and Lemieux, 2018: 53).

Lending activities of Fintech platforms started during the 2008 financial crisis. These lending activities can occur in three ways: crowdfunding, market lending (MPL) and peer-to-peer lending. Considering the online structure of Fintech platforms and the products and services they create, it is clear that the financial system is a new phenomenon (Jagtiani & John, 2018: 2). Fintech platforms share in the credit market between 2007-2015 from 3% to 12% is one of the most important indicators of this situation (Buchak et al., 2018: 482).

Fintech platforms can also create a deposit pool by collecting funds from depositors like banks. However, they need legal arrangements to collect deposits and thus provide liquidity services. For example, deposit collection and cash lending transactions in Turkey are organized in accordance with banking law. Therefore, arrangements must be made in order for Fintechs to be able to perform the liquidity functions of the banks. In this case, Fintechs will also have to be subject to partial reserve conditions such as banks.

In addition, the fact that banks are subject to minimum capital adequacy and deposit insurance liabilities protects depositors against risks. The fact that Fintech platforms facing such obligations will increase their costs. In addition, both traditional systems and banking regulations ensure that banks are primarily responsible for some asset owners. These liabilities include the payment of priority to the holders of deposit and debt instruments (bonds and bills). In this case, it gives banks a significant advantage over the Fintech platforms (Navaretti et al., 2017: 14).

Another issue that needs to be addressed here is whether the credit risk is paid by the intermediary institution. Banks keep some of the risks related to the loans they have given in their balance sheets. In contrast to this situation, Fintech leaves the risk either in the customer or in the insurance company. Therefore, Fintech platforms have to produce new solutions for the credit risk of depositors. For this reason, it is observed that the parties who wish to provide credit through Fintech platforms intensify their activities in two cases. These situations; i) Areas where traditional banks operate less, ii) local economic conditions are more challenging areas (Jagtiani & Lemieux, 2018: 53).

Fintech platforms use the “agency model” when performing crowdfunding activities. Because they do not take risks during this activity. In addition, platforms receive commission income from the parties but the transaction price is determined between the parties (Anagnostopoulos, 2018: 10). In this case, investors will apply to Fintech platforms with high-risk perception and therefore an expectation of return. In addition, those in need of funds who want to take advantage of these platforms are expected to have relatively low credit ratings. Therefore, the products and institutions in which Fintechs are trading seem to be riskier than the banks. According to all these explanations, banks dominance in the field of deposit collection and lending does not appear to be a threat in the short and medium term, given their capacity to adapt to digital innovations.

Payment Services

The basic functions of the banks are deposit collection and lending, as explained in the previous sections. It is also known that banks provide a combination of many services, unlike Fintechs, when performing these functions. Therefore, banks have specialized in payment services while performing these activities. Because banks have developed payment systems so that depositors can pay from their accounts. In addition, the system has been designed so that credit and credit card customers can pay.

These payment services can be performed in many different ways, from ATMs to POS devices, from cash payments to transfers of funds between accounts. Today, mutual funds transfers between accounts have become prominent in payment services with the help of technological innovations. Aforementioned, most of these transactions are carried out by banks. Recently, they started to provide payment services in institutions outside the banking system. However, unlike traditional banking services, these services can be performed with a password and biometric verification via Fintech via a quick and single platform (Kang, 2018: 14).

There are various obstacles in the way platforms outside the banking system specialize in payment services. The first of these reasons is that the permission to open deposit accounts in some countries, such as Turkey, depends on strict rules and is usually given to banks. Therefore, the failure of non-banking institutions to provide deposit accounts to their customers will result in failure of payment services to perform effectively. The second is due to the high risk of institutions other than the banking system, depending on the first reason. For this reason, customers with high credit rating may prefer banks that are considered to be less risky. Finally, only banks are authorized for interest payments in countries like Turkey. Therefore, keeping money in a system that does not pay interest will have no meaning.

In terms of payment services, platforms other than the banking system also have some advantages. One of these advantages is that Fintechs are more flexible in adapting to digital innovation. Therefore, these platforms gain the advantage by taking advantage of technology faster thanks to their flexible structure. Second, Fintechs can perform payment services at a lower cost. This is because of Fintechs act with intensive technology and less labor potential. However, banks use similar cost advantages in part. For example, when certain banking products and services are performed with internet or mobile branches, more advantageous opportunities can be offered for the customer. Finally, according to the obligations of banks, Fintech is faced with less legal obligations (Navaretti et al., 2017: 16).

Local authorities will determine the impact of legal arrangements on payment services. However, the flexibility of local authorities in regulations for Fintechs will allow them to maintain their regulatory arbitrage advantages. Otherwise, Fintechs will lose their competitive advantage.

Perhaps the most important competitive advantage of Fintechs in payment services is the technique. Fintechs can act faster in compliance with technological innovations than other financial institutions. Especially since banks are subject to restrictive legal regulations, the process of adapting to innovations is prolonged. This can create an advantage for Fintechs in the short term. However, as understood from the practices so far, banks are capable of using the same or similar tools as Fintech. Therefore, banks can overcome this disadvantage in a short time.

Another issue that needs to be examined within the scope of payment services is the situation of companies that make their commercial activities digital. In the international arena, such as Amazon and Apple, Turkey is exclusive N11.com a comprehensive economy emerged between e-commerce sites such as Hepsiburada and platforms that provide payment services. Such companies may be able to use

consumer credit for purchases. It should not be forgotten that banks with a wide customer database are more effective in the instant lending process.

It is useful to use the N11 sample to explain the effectiveness of Fintechs and banks in shopping. The N11 company offers its customers various payment options. These payment options are a credit card, debit card, virtual card, BKM Express, Masterpass, GarantiPay, Paycell, İşbank instant shopping credit, Garanti shopping credit, and Akbank direct payment. Apart from traditional payment systems, consumer credit and Fintechs are studied here. These systems enable the emergence of a comprehensive economy between consumer firms and digital platforms.

Within the scope of payment services, the payment of consumer loans is performed by one or more banks. To use this system, it is necessary to scan and process the customer database very quickly and effectively. Otherwise, delay and complexity in transactions may result in the failure of sales. At this point, one of the most important problems may arise in relation to the processing of personal data.

Another payment service is provided by the company N11 via Paycell. Turkcell, a market leading communications company in Turkey, has been investing in Fintech, offering customers three different payment methods. These are; payment by credit card, payment by Paycell card, and payment by digital money. Therefore, digitalization in international and Turkish payment services is realized through both Fintechs and traditional banks.

In this Section, Fintechs and banks are compared based on payment systems within the framework of the explanations above. As a result of the discussion, it is considered that it is possible to follow the advantages of Fintechs in payment services by banks in the medium and long term. However, it is seen that the effects of Fintechs on commercial life are progressing at an increasing rate.

Data Collection and Processing Activity

Information is the most important tool for the financial system and the institutions in the financial system. All financial institutions perform information collection and processing activities within the framework of their activities. Technological innovations have made major changes in the collection, processing, and transfer of data. Data is stored at high capacity and low-cost thanks to technologies such as cloud computing. The data required for financial institutions has become more accessible thanks to the increased technology. And finally, the data is transferred at lower costs through digital networks.

The most outstanding aspect of digital platforms compared to the banking system is the effective use of Information Technologies. Changing the consumer profile is also effective in this regard. The consumer profile is now composed of the X and Z generations. The most important feature of these generations is that they grow together with technological innovations. For this reason, they tend to use digital platforms instead of traditional tools such as banks and ATMs (Anagnostopoulos, 2018: 10).

The process of collecting, processing and distributing information for Fintechs are different from other financial institutions and especially banks. However, it should not be forgotten that banks and Fintechs are information-based structures, as in other financial organizations. Unlike banks, Fintech platforms benefit from alternative data and complex algorithms as well as big data (Jagtiani & John, 2018: 2). Therefore, any change in the information field of digital technologies will affect these institutions. In particular, it is clear that Fintech has changed the structure and presentation of the services provided by the platforms.

Nowadays, the digital universe has become the most valuable "thing". Nowadays, financial products are produced within the framework of the information. It can represent a situation in which the "just in time production-JIT" model is used in these financial products. Because financial institutions can anal-

use their customers risk-return profiles, behavior patterns, and their needs through information. For this analysis, “machine learning” is sometimes used. As a result, appropriate financial products are produced and sold in accordance with the resulting profile. The intelligence work of financial institutions such as banks is of course not new. However, the new digital information is only exceeded the financial limits and a wider set of data is used. At the same time, the rate of data collection, processing, and distribution has reached a point that can be expressed in seconds.

In this framework, Fintech platforms combine buyers and sellers in the digital environment. Since both the buyer and seller’s properties and financial product preferences are determined by the platform, information effectiveness increases significantly. At the same time, there is a positive correlation between the effectiveness of the transactions on these platforms and the number of processors naturally. Fintech platforms can also earn credit ratings by means of their user profiles. This situation also provides efficiency in price differentiation to platforms.

It is clear that the tool that provides Fintechs with this efficiency is a rapid change in technology. So technological innovations not only reveal the Fintech platforms, but also the tools that feed these platforms. It is a known fact that financial institutions conduct intelligence activities about their customers with basic statistical information. But it is possible that these activities become fast, reliable and cost-effective with more advanced technologies. This is where machine learning is involved. Now through learning computers, customer evaluation, profiling, rating, and pricing are realized in a very short time. This technique also allows categorizing customers according to certain standards. Thus, products and services can be offered quickly by customer categories (Navaretti et al., 2017: 20).

There are some problems with accessing data and converting data into information (Navaretti et al., 2017: 19). The first of these problems is which person or organization can access such a big repository of data. Extracting financial profiles of customers requires a lot of knowledge. Of course, it seems that companies such as Apple, Amazon, AliExpress can easily access data of this size. However, it is very difficult for smaller companies to have access to such data with their own facilities. However, there are graphics-based applications that are built to handle big data with graphics. These applications, which are especially important for investment banks, are also provided by Fintech platforms (Qi & Xiao, 2018: 69).

For this reason, digital platforms generally offer the products and services they offer through mobile applications. Services based on big data analysis are extremely rare. Services provided by Fintechs can be listed as follows (Nomakuchi, 2018: 3):

- **Payment Services:** Fast and secure mobile payment
- **Remittance:** Through mobile applications
- **Investment:** Social Lending
- **Funding:** Cloud Fund
- **Credit Intelligence:** Using Big Data
- **Asset Management:** Asset management services for households
- **Asset Management:** Automatic investment with artificial intelligence
- **Fraud Detection:** Fraud detection through machine learning
- **Security:** Authentication technologies such as voice recognition and fingerprint detection
- **Virtual Money:** Cheap transfer abroad using virtual Money

The most advantageous institution for financial profiling is the traditional banks. The larger the customer portfolios of banks, the wider the pool of data. Therefore, data acquisition functions for banks and

other financial institutions as well as for customers financial returns have become extremely important. Nowadays Fintech platforms do not have the opportunity to access information as much as banks. This raises the cost of information for Fintechs. However, the information obtained by Fintechs is known to be higher than that of their flexible structures.

If Fintechs want to have large-scale knowledge, they can go on to establish new business partnerships. They will be able to obtain this information with the support of traditional banks. Legal arrangements in some countries also force banks to share information they have acquired. Therefore, Fintech platforms can access the information that banks have.

The second major problem is the problems that occur in obtaining and using this information. The risks to information security, issues related to the privacy of private life, and inappropriate methods in collecting and processing personal data constitute the basis of the discussion. In particular, recent cyber frauds and investigations into data collection, processing and sharing on social media platforms such as Facebook reveal the seriousness of the issue.

In recent years, legal arrangements have been made in many countries concerning the collection, processing, and distribution of such data. In this context, the Personal Data Protection Act in 2016 in Turkey has been removed. This law gives individuals the right to protect their data. In this context, it is considered that institutions that are kept under supervision by regulatory and supervisory authorities, such as banks, are more likely to have access to information. This can give banks a competitive advantage in information.

The third problem is whether or not traditional credit assessment models can be replaced by models such as machine learning. In traditional credit assessment, a credit officer makes an assessment with the basic information of the customer. In the machine learning model, the financial and non-financial information of the customer needs to be taught to the computer and evaluated according to the results. Although there may be a resistance to this new model, it is considered that these two models will become complementary elements over time.

Finally, traditional banks and Fintechs have different tendencies to process and update customer data. Banks make some changes in liquidity and credit risk as described in the previous section when establishing a debt relationship with their customers. They also keep some of the risks in their balance sheets. Since this is explained in the previous section, this section will not be mentioned in detail. Fintechs do not take over liquidity and credit risk. They usually leave it on the client or transfer it to an insurance company. This situation brings Fintechs to a disadvantaged position compared to banks in order to monitor and gather information.

If this section is to be considered for collecting, processing and distributing information, Fintechs are faster in comparison to banks. However, banks may have lower cost data, especially because they have big databases. Supervision of banks by supervisory and regulatory agencies creates a competitive advantage in this regard. In the light of all these discussions, Fintech's ability to digitize and use the data, despite the speed advantage of accessing the data and the cost of data can be said to have a disadvantage.

COMPARISON OF FINTECH AND BANKING SYSTEM

In the second part, Fintech ecosystem and banking activities were compared. Fintech platforms have determined that banks will affect each other in many fields of activity. This enables Fintech platforms to think that banks will play a complementary role in their activities. In this section, Fintechs and banking

system have been compared in different ways. First of all, Fintech platforms and banks were compared with the size of finance and income structures. In the next part, the competition situation between these two institutions was analyzed. In the last part, it was compared with the banking system based on the regulations that Fintechs are likely to be subject to.

Financing and Income Structure

Banks are dependent on the system based on traditional models in terms of finance and income structures. This model can be called a “wholesale model”. In this model, banks lend their funds through deposits through lending. One of the most important factors that enable banks to be preferred by their customers is a credit risk. Banks keep part of the return risk of the financing they provide in their balance sheets. Fintech platforms usually perform a matching transaction between the creditor and the financing party. In this matching process, the credit risk remains at the institution providing financing. This model used by Fintech platforms is called the “agency model”.

According to the explanations, banks are more advantageous in financing compared to Fintech platforms. However, there are situations to be considered here. First of all, the direct matching service provided by Fintech platforms can offer cost advantages compared to the credit service provided by banks. Second of all, Fintech platforms can serve customers in a wider range of credit rating ranges. Banks may be more sensitive to the choice of customers because they take over part of the credit risk. Finally, Fintech platforms may be subject to more flexible regulations than banks. This provides a wider credit portfolio compared to the banks on the Fintech platforms.

There are significant differences between Fintech platforms and the methods of generating income between banks. As explained earlier, banks obtain a significant portion of their income from the interest margin. This margin is based on the difference between the interest rate of the banks to deposit and the interest rate they obtain from the amounts they have used as credits. The Fintech platforms usually rely on the matching method of crowdfunding. Therefore, they do not perform activities such as collecting deposits and lending. For this reason, both sides of the debt relationship, the fund offers, and the fund demands, fees are paid.

The most important condition for ensuring that the wage income of Fintech platforms is sustainable is that its activities continue to expand. Because the fixed costs of the platforms are quite high. On the other hand, their marginal costs are low. Due to the fact that digital platforms charge for each transaction, the width of their activity will be proportional to the size of their revenues. For example, 90% of the income from lending clubs operating in the United States of America in 2017 is based on the wages they receive as a result of the activities (Navaretti et al., 2017: 22).

Another important factor for Fintech’s income to be sustainable is the correct determination of the funding supply and demand segments. The objective of the activity should be to bring both sides together within the framework of the highest transaction income. For this reason, the highest income should be targeted when selecting the parties. It should not be taken into consideration that any of the parties offer a low price, nor should it be considered that they offer a high price. The important thing is to determine the optimal income.

When these two elements are evaluated together, it is considered that the most important source of problems that may arise within the scope of platform revenues is the obligation of the platform to agree with more parties for higher wages. This may reveal the problem of information asymmetry. Because the parties competitiveness and market forecasts will not be the same. For this reason, it is likely that negative

selection problem will arise during the transactions taking place on digital platforms. Blockchain technology is expected to be used to solve the information asymmetry problem. (Cai, 2018: 986). However, one of the ways Fintech platforms can solve this problem seems to be to use traditional banking methods.

The Effect of Competition

The rapid development of Fintech platforms has a variety of effects on financial markets. These effects occur both in traditional financial structures and in new financial institutions and instruments. Traditional brokers in the financial markets are beginning to use new techniques, while the market is also familiar with new financial instruments. Therefore, while traditional financial institutions and digital platforms develop competition, they try to adapt to this new situation (Cai, 2018: 986).

Competition between the traditional banking system and digital platforms will make it easier to understand the collection of the subject under various headings. Accordingly, the subject will be examined under the headings of financial products and services, customer and digital information. While determining these topics, the most common contact points of banks and digital platforms are taken into consideration. This framework will make it easier for both institutions to present the impact of competition more effectively.

The first element to be examined when analyzing the impact of competition on traditional banks and Fintech platforms is the products and services offered. One of the most important advantages of the traditional banking system compared to digital platforms is that it offers financial products and services as a complimentary package. In contrast, Fintechs usually specializes in a particular product and service. However, while offering these products and services, the most important advantage of digital platforms is that they are exempt from regulations that banks are subject to.

Fintech platforms currently have no effect on the banking system's products and services. However, the point to be considered here is the capacity of Fintechs to provide products and services to customers who do not take the bank's portfolio. This also increases the potential of Fintechs to generate higher income. In this way, the risk of banks being certain and offering lower income products and services should be taken into account in the long term.

In spite of these advantages, Fintechs have not been able to dominate the financial products and services market in the short and medium term. There are several reasons for this situation. First, banks have high public trust. Therefore, it is a very low-cost financing source for large segments of the market.

A significant disadvantage of Fintechs against banks is that they are perceived as relatively high-risk institutions. This is likely to increase supervision and regulation on digital platforms. Nowadays, the regulations that the Fintechs face are different from country to country. Finally, especially banks with a wide operating network attract attention to the tendency for digital innovation. Banks tend to use the digital business models used by Fintechs in a short time. In this case, Fintechs and banks can be expected to become complementary institutions in the future.

The second important factor in the competition between the traditional banking system and the Fintech platforms is the customers. Digital platforms for customer selection show different approaches from country to country. In some developed or developing countries, platforms incorporate customers outside the banking system into their portfolios. In this way, while offering products and services of digital platforms, costs are reduced and revenues are rising. Especially in developed countries, Fintech platforms try to compete against banks by using advantages such as speed, information technology and quality of service (Navaretti et al., 2017: 24).

When looking at the customer selection criteria of the banks, certain standards are generally observed. Banks tend to provide services to their customers that have met certain standards by analyzing their client's information. One of the reasons that drive banks into this situation is the regulations they are subject to. Fintech companies are flexible to choose customers because they do not keep the risks on them. However, high digitization forces Fintech platforms to create and use certain standards. This reduces the operational costs of Fintech platforms and increases the operational speed.

As in all sectors, customer-focused activities are highlighted in the sectors where businesses operate in the finance sector. Although banks try to be customer oriented, as described above, they have difficulty meeting the changing customer needs because they cannot perform product personalization activities and adhere to certain standards. This creates a significant competitive advantage for Fintechs, a more flexible and customer-focused business (Anagnostopoulos, 2018: 10).

Another important factor in the competition between Fintechs and banks are digitalization. Fintech companies differ from the information management systems used by traditional banks. Because Fintech platforms use different sources of information, such as social networks, when performing their activities. Banks mainly use information obtained from traditional intelligence methods in information systems.

On the other hand, it is clear that digitalization also brings cybersecurity risks. However, in recent years, especially the technologies developed by companies such as ApplePay and Google can be said to have eliminated this vulnerability. This has created an important advantage in providing Fintech platforms with its products and services (Anagnostopoulos, 2018: 10). This advantage has affected all services, including lending services. Platforms such as Apple Pay and Samsung Pay have emerged as non-financial institutions that perform traditional financial services and have laid the technical foundations for Fintech (Yoon & Jun, 2019: 181).

Banks use more relationship banking methods when conducting their operations. Fintech platforms generally provide peer-to-peer loans. Today, it is seen that firms are turning to peer-to-peer credit as a strong alternative. This situation not only as an alternative, but also the competition between banks and digital platforms is becoming profitable for companies.

Regulations

As stated in the first part, Fintech platforms can be defined as organizations that carry out banking activities with new techniques. Fintech platforms take advantage of digital innovations while carrying out these activities. However, one of the important advantages of these digital platforms compared to banks is, at least for now, the regulations that it is subject to. Thus, these platforms have the potential to serve faster and easier (Jagtiani & John, 2018: 2).

Fintechs have a significant cost advantage because they are not subject to legal procedures compared to traditional banks (Anagnostopoulos, 2018: 10). As an important indicator of this situation, the operating expenses of the banks compared to the credit volume were around 5-7%, while this ratio remained at only 2% level for Fintechs (McKinsey, 2015).

It is obvious that Fintech platforms have a competitive impact on financial markets. These platforms operate without being subject to some of the regulations of the banks. In this case, entering a sector that is extremely difficult to increase competition. However, the fact that Fintech platforms operate without being subject to regulations causes serious concerns about financial stability. This increases the risk of customers and raises certain doubts about the activities. However, it is clear that a balance between

competition and financial stability should be established in order to avoid the competitive impact of Fintech platforms on the banking system.

In making arrangements regarding Fintech platforms, the advantages and disadvantages of the activities of these platforms should be taken into consideration. As mentioned above, financial stability and therefore consumer protection should be taken into account when making this assessment (Jagtiani and Lemieux, 2018: 53). For example, the fact that Fintech platforms continue to operate in a digital environment raises the question of the data breach. Studies on this subject reveal that stability cannot be achieved without a balanced regulation on the data breach (Yoon and Jun, 2019: 183).

The parties who have business relations with Fintech institutions want reasonable assurance both in terms of financial security and information security. First of all, the parties serving from Fintech platforms expect the institutions where they deliver their money to be financially secure. On the other hand, those who have business relations with these platforms want to know that their personal data is safe. In both respects, countries are looking for solutions to the security problem by making different legal arrangements. For example, Fintech activities were organized within the scope of Law numbered 6493 on Payment and Securities Reconciliation Systems, Payment Services and Electronic Money Institutions, which effectuated in 2013 in Turkey.

Establishing a regulatory framework in the activities carried out by Fintechs may prevent banks from performing these activities from performing transactions like digital platforms. In this case, it may be assumed that platforms must be subject to regulations according to business volume in order to achieve effective competition. In this case, platforms performing certain activities in a specific volume of business will not be faced with all banking regulations. Thus, the competition will continue in the sector. On the other hand, a progressive regulatory framework for Fintechs will be able to help keep the risk at a certain level. In this case, there is a certain balance between financial stability and competition. Table 1 includes the comparison of traditional banking and Fintech platforms from various aspects.

Table 1. Comparison of Fintech platforms and banking

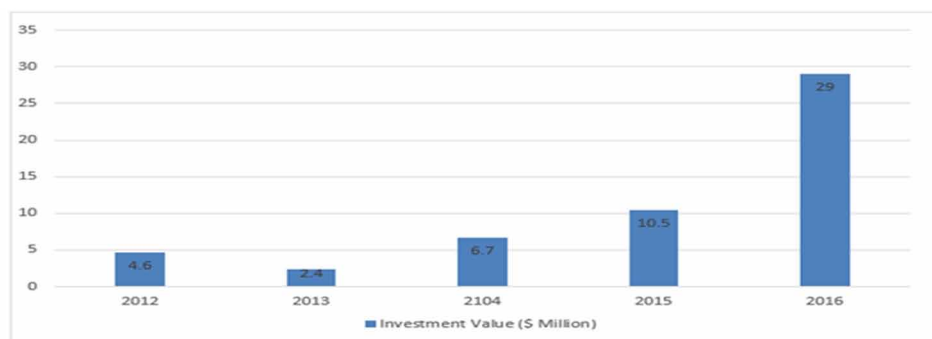
FACTORS	FINTECH PLATFORMS	BANKING
RISK	They don't take the risk. They leave the risk on the customer or the insurance company with one-to-one matching.	They keep part of the risk on their balance sheets. They are also subject to minimum capital adequacy regulations.
MATURITY TRANSFORMATION	The maturity of Crowdfunding loans is determined between the parties.	They convert short-term funds into long-term financing instruments.
PAYMENT SERVICES	They offer fast and single platform payment services with a password and biometric verification.	They use mobile payment methods in addition to payment methods such as debit cards and credit cards.
DATA COLLECTION AND PROCESSING	In addition to big data, they use alternative channels and complex algorithms.	They use big data. They tend to use traditional methods while obtaining data.
FINANCING MODEL	They use the agency model. They don't take the risk. On the other hand, they offer a cost advantage.	They use the wholesale model. They keep part of the risk on their balance sheets.
INCOME METHOD	They receive fees from both sides of the credit relationship.	Gain a significant portion of their income from the interest margin
REGULATIONS	Although this varies from country to country, most of the activities are not regulated yet.	All activities are subject to legal regulations.

TURKISH FINTECH ECOSYSTEM

This part of the study in Turkey will be given information about the status of the Fintech ecosystem. Fintech investments in Turkey are increasingly expanding. According to the Deloitte company's report published in April 2017, Fintech investments in Turkey increased from \$4.6 million to \$29 million between 2012-2016. In this period, the total investment amount was realized at \$52 million (Deloitte Turkey, Fintech Ecosystem Report, April 2017). Figure 2 shows this situation.

Figure 2. Invested value in Turkish Fintech ecosystem

Source: BKM, *The Turkish Fintech Ecosystem Progress Report 2016*.



Source: BKM, *The Turkish Fintech Ecosystem Progress Report 2016*.

This increase in Fintech investments has led to an increase in competition. However, competition in the sector did not prevent the development of cooperation. For example, in 2012, BKM Express managed to implement the digital wallet application with the merger of leading e-commerce firms and banks. This shows that there is a tendency for convergence between Fintech platforms and traditional banks in Turkey, similar to the situation in the world.

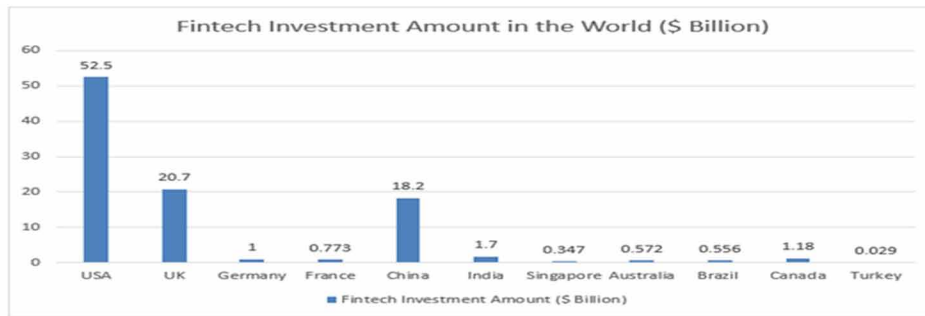
When Figure 3 is examined, it is clear that Fintech investment in Turkey is low compared to the global scale. Mention may be made of Fintech investment in Turkey is low compared to the global scale. However, this situation shows that the expansion potential of Fintech investments is also high. Deloitte's "Connecting Global FinTech: Hub review" report highlights that in countries where economic growth is limited, Fintech has high growth potential and therefore innovation opportunities (Deloitte Turkey, Connecting Global Fintech: 2017 Review of Interim Huber).

The factors affecting the expansion of Fintech investments include innovation, expertise, foreign capital, proximity to customers and regulations. The situation of these factors is promising in Turkey. This reveals the potential for expansion of the Turkish Fintech Ecosystem. One of the reasons for the rapid growth of Fintech investments in Turkey is the sound structure of financial institutions, especially in the banking sector. The robust structure of the banking system can be seen as an important advantage given the country's young population and its predisposition to digital innovation.

The main areas attracting Fintech investments in the world are payment methods, mobile banking, asset management, lending, InsurTech, crowdfunding, and Blockchain-Bitcoin. In Turkey, Fintech focuses on payment methods, mobile banking, asset management, capital markets, and digital currencies. Therefore, activities in this area are realized in areas such as prepaid cards, wallet applications, payment

Figure 3. Fintech investment amount in the world

Source: Pulse of Fintech 2018, Global Analysis of Investment in Fintech, KPMG International (data provided by PitchBook) January 4, 2019.



Source: Pulse of Fintech 2018, Global Analysis of Investment in Fintech, KPMG International (data provided by PitchBook) January 4, 2019.

tracking, offline payment, money transfer, discount and loyalty cards, budget management, collection, POS management, pre-accounting, VPOS, cash register, banking software, and credit scoring (Deloitte Turkey, Turkish Fintech Ecosystem Report, April 2017). In the Turkish Fintech Report published by Ernst&Young company in 2018, four main headings affecting the Fintech ecosystem and the factors of these headings were determined as shown in Table 2.

The factors affecting the activities of Fintech organizations operating in Turkey will be evaluated briefly within the framework of the four main headings above. Considering the demand factor, it is seen that the financial services sector in Turkey has been organized very strongly as a result of the crises. This shows that the demand for Fintech services will be high, given the young population and the population's tendency to digital innovation.

The demand for the activities of Fintech establishments operating in Turkey is not only due to domestically. Institutions with a specific intensity of activity can also be opened to the Middle East, the Balkans and Central Asia. Similarly, there are Turkish Fintech platforms operating in developing countries such as India (23 Proposal for the Sustainable Development of Turkish Fintech Ecosystem, Ernst & Young, 2018: 17).

As stated in section 3.3, Fintech activities of the organizations are regulated in Turkey under the No. 6493 Payment and Securities Settlement Systems, Payment Services and Act on Electronic Money Institutions. In addition, a new and more comprehensive arrangement is expected to be made concerning the transfer of money between spouses in Turkey.

The law no 6493 stipulates the obligation to obtain operating permits for payment, e-money institutions, and system operators. At the same time, under this arrangement, Fintech establishments have also been required to comply with certain processes. The obligations imposed by the said law have increased the trust in the activities of Fintech organizations. However, it is considered that this situation will lead to a certain decline in the competitive strength and cost advantage of Fintech platforms.

Turkey is trying to provide support to the Fintech ecosystem through TUBITAK (Türkiye Bilim ve Teknik Araştırma Kurumu in Turkish- The Scientific and Technological Research Council of Turkey) and the EU (European Union) funds. On the other hand, Fintech platforms are shy about the support of these organizations. These platforms tend to attract more angel investors, venture capital and bank incentives for capital needs. One of the biggest obstacles in front of Fintech platforms in Turkey is conjecturally

Fintech Ecosystem and Banking

Table 2. Four headings of Fintech ecosystem and affecting factors

HEADING	FACTOR	EXPLANATION
DEMAND	Country Market Structure	The current structure of the financial services industry in Turkey and the position of the fintech's
	Competition	The competitive environment in the FinTech industry and the FinTech industry with other financial institutions
	Consumer Behavior	Consumer perspective on the FinTech industry
	Customer Experience	The benefits and advantages of FinTechs in customer experience
	Opportunities and Threats	Opportunities and threats in FinTech's areas of activity
	New Markets	New markets in the financial services sector
REGULATION	Trust and Security	The public's confidence in the information security and financial sense provided by FinTechs
	New Regulations	Design and implementation of new regulations to regulate financial markets and affect FinTechs
	Activity Permit	Activity permit specifically applicable to payment and e-money areas
	Restrictions and Obstacles	Restrictions and obstacles on FinTech faces offering specific services
CAPITAL	Public Funds and State Support	Public support and incentives provided to FinTechs
	Banks	Investments and financial support provided by banks to FinTech
	Investors	Factors affecting angel investors, venture investors and IPO investors investing in FinTech
	Business Model	New and creative business models of FinTechs to attract new investments
HUMAN RESOURCES	Quality, Quantity and Cost	The quality and quantity of human resources available on the market and the costs of the new human resources
	The Role of Financial Institutions	The role of the organizations operating in the financial services sector in raising human resources
	The Role of Universities	The ability of universities and other educational institutions to train human resources in the FinTech sector
	In-house Entrepreneurship	Perspectives of institutions on entrepreneurial ideas

Source: Ernst&Young Report 2018, 23 Recommendations for the Sustainable Development of Turkish Fintech Ecosystem.

considered to be difficulties in attracting foreign capital to the country (23 Proposal for the Sustainable Development of Turkish Fintech Ecosystems, Ernst & Young, 2018: 19).

Turkey Fintech ecosystem also faces certain challenges in finding human resources. Fintech platforms have a disadvantage compared to banks considering salary and other additional conditions. Fintech institutions have intensified employment opportunities for transfers from universities and other Fintech companies.

When the Fintech ecosystem of Turkey is evaluated as a whole, it is seen that it carries a potential open to development and is expanding every year. Although there are some problems in front of the Fintech ecosystem, it is clear that the solution suggestions for these problems are also being developed. Turkey has the advantage of offering Fintech products and services to developing countries with its geopolitical position. Turkey's young and dynamic population, human resources and investor Fintech platforms for both the customer and seems to be at the point of becoming valuable. At this point, it is considered that

the Fintech ecosystem of Turkey has a great potential for the future of the country with the steps taken by both the public and private sectors.

CONCLUSION

Financial markets and institutions are constantly changing and evolving structure. Nowadays, technological innovations play an important role in the dynamics of this change. Developing technology has significantly affected the financial resources of companies. The most important result of this technological impact is that Fintech platforms are emerging. These platforms are also the result of digital innovations that make electronic commerce and e-business models possible.

Fintech platforms have developed a more innovative and digital business model instead of traditional financial companies business models. Fintech platforms have developed a digital business model that takes customers to the center especially in terms of payment and lending services. Back-office operations, digital banking, e-commerce, identity management, payments, and insurance are the main areas of these platforms.

Within the scope of the study, Fintech platforms and banking activities were compared in various ways. In this comparison, in addition to the activities performed by the traditional banking system, the outputs of the activities obtained as a result of these activities were also taken as a basis. Fintech, which operates in Turkey, is mainly based on the study comparisons. In the last part of the study, information was given about the Fintech Ecosystem of Turkey. The reason for this is that there is not much work done in the literature on the Turkish Fintech Ecosystem. In this context, the study contributes to both the comparison of Fintech and its banking activities and outcomes and to the literature on the study of the Fintech ecosystem of Turkey.

Within the scope of this study, traditional banking activities were evaluated as part of risk and maturity conversion function, payment services and information collection and processing activities. Banks serve their customers by converting risk and maturity. While banks convert the funds they collect from their customers into loans, they keep a portion of the risk in their balance sheets. Thus, the customer is protected from credit and liquidity risk to a certain extent. Fintech platforms provide peer-to-peer loans to their customers. In this credit relationship, the risk is left on the customer or transferred to the insurance company. Therefore, Fintech platforms do not assume the risk in any way. However, it should not be overlooked that Fintech platforms are considered as an alternative for the parties who have difficulty finding credit. The most concrete example of this situation is that the Fintech platforms emerge as an important factor in the credit market after the financial crisis.

When Fintech platforms and banking system are evaluated on the basis of risk and maturity conversion function, the platforms have advantages of speed and flexibility in the face of the assurance services of banks. However, when the bank's susceptibility to digital innovation is evaluated, Fintech platforms are considered not to pose a threat to the banking system in the short and medium term. Within the scope of payment services, it is seen that Fintech platforms create alternative and competitive channels. However, at this point, a significant portion of its activities are carried out either by cooperating with banks or by entering into the banking system. A significant reason for this is that payment services and deposit accounts are closely related. As banks can provide these services as a package to their customers, it is obvious that they have an important competitive advantage.

With Fintech platforms, banks collect information when performing their activities with their customers. They process the information they collect in order to use it both in their current activities and in the future. In this context, banks are considered more reliable in society as they face supervisory and regulatory practices. This situation can create an information asymmetry problem between Fintech platforms and banks. Fintechs can be considered as an important disadvantage in terms of this situation can be eliminated in order to make arrangements can be reached. However, this will negatively affect the cost advantage of Fintech platforms.

It is obvious that Fintech platforms have an innovative impact on financial institutions, vehicles and activities, especially banks. Fintech platforms affect the manner and structure of banking activities. Banks now operate as institutions that benefit more from digitalization and are in cooperation with Fintech platforms. However, it is clear that Fintech platforms cannot be a threat to the banking system at this time. Instead, it is more likely that Fintech platforms and banks will transform into another form of business in cooperation. The recently discussed concept of “TechFin” is a clear sign of this.

The activities of Fintech platforms are commonly observed in developed markets. Recently, however, Fintech investments have been also increasing in developing countries. Turkey has found an important place in these countries. The reasons for this include the dynamic young population and growth potential of Turkey capital markets. In this context, Turkish Fintech Ecosystem has attracted significant investment almost every year. On the other hand, as a result of the close historical and sociological ties, Turkey has the potential to become a Fintech center for Middle East countries. In 2013, Turkey made a regulation covering Fintech activities. In general, Turkish Fintech Ecosystem has high development potential and needs investment.

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KEY TERMS AND DEFINITIONS

Big Data: Big data is an extremely large set of data that allows computational analysis to reveal particular human behavior, trends, and relationships.

Blockchain Technologies: Blockchain is a scattered database consisting of blocks of chain structure and provides encrypted process tracking. Blockchain technology is a digital technology used primarily in crypto money.

Crowdfunding: Crowdfunding is the transfer of certain amounts of capital from a large number of people, in particular to fund a business venture through Fintech platforms.

Digital Banking: Digital banking is the presentation of the products and services offered by the traditional banking system through digital platforms.

Digital Business: Digital business is an innovative business model created by combining physical and digital methods. Digital business models range from e-commerce and e-business applications to Fintech platforms.

Fintech: FinTech describes a business that aims at providing financial services by making use of software and modern technology.

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Chapter 18

Regulating FinTech Businesses: The Malaysian Experience

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ABSTRACT

The Malaysian finance industry is governed by Bank Negara Malaysia (BNM) and Securities Commission Malaysia (SC). BNM governs the banking and insurance industries and the SC regulates and develops its capital market. Both authorities have issued regulations to cater for the proliferation of fintech businesses. For example, BNM issued regulations on digital currency exchanges, electronic-know your customer requirements for fintech companies facilitating remittances, and a regulatory sandbox framework for fintech businesses. Similarly, the SC issued a digital investment management framework, another to facilitate equity crowdfunding, peer-to-peer lending, and digital asset exchanges, and the instrumental digital currency and digital token order. All were issued to encourage innovation in the industry, manage disruption, mitigate risks, and ensure consumer protection. This chapter will explain the steps taken by Malaysia's financial regulatory authorities in dealing with fintech-based companies, critically review the regulations, and recommend some ways forward.

INTRODUCTION

Research has shown that regulation and in particular macroprudential regulation, is one way to deal with systemic risks and ensure financial stability of a financial system (Allen & Gu, 2018). While regulation alone cannot ensure financial stability it is one of the tools available that is effective (Allen & Gu, 2018). Research also shows that markets and institutions that fell outside the regulatory perimeter of governance during the financial crisis in 2008-2009 was a cause for financial instability (Lipsky, 2012). Following this it is only relevant to the topic of this book that regulatory steps taken to mitigate against

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risks associated with fintech should be reviewed as a tool to ensure financial stability of the Islamic financial system. In this chapter regulations that Malaysia has recently issued to include fintech within the purview of its regulators will be reviewed. This introduction will proceed with explaining the benefits and risks associated with fintechs and the layout of this chapter.

The use of technologies in financial services, known as fintech, holds many benefits for business, whether small, medium, or large. In particular, fintechs offer more efficient and cost-effective solutions for businesses seeking financing through equity crowdfunding (ECF) or peer-to-peer lending (P2P) platforms. For example, Nusa Kapital claims to be the world's first fully Shariah compliant P2P platform operating in Malaysia. Regulated by the Securities Commission Malaysia (SC), it performs the role of an intermediary between businesses and investors seeking alternative means of financing and investment (Nusa Kapital, 2017). Other solutions fintechs can offer are online trade finance, online supply chain finance, and invoice finance (Australian Government Treasury, n.d).

The global rise in fintech start-ups, thus, comes as no surprise (KPMG, 2018). Indeed, KPMG reported that investment in fintech companies in the first 6 months of 2018 alone surpassed the total number of fintech investments in 2017 (KPMG, 2018). However, with the proliferation of fintechs comes the need to ensure adequate regulation. As such, an appropriate legal framework is necessary to protect and safeguard the interests of the public and businesses alike as a number of risks arise with its introduction, many of which may not be easily identifiable due to the technology's newness (Kovas, n.d). The creators and providers of fintech must therefore include proper risk identification and management systems.

The risks that have been identified thus far can be categorized into three broad categories: speed, safety, and illegal activity. Ideally, the improved speed of transactions must be commensurate with the speed at which fraud or other malpractice is identified and reported necessitating fintech's creators to include efficient systems for the specific purpose of identifying and reporting wrongdoings (Kovas, n.d). Safety from cyberattacks and hacking is another concern that needs addressing, an example of which can be seen in the 2018 theft, through cyberattacks, of USD500 million from the Japanese digital currency exchange, Coincheck Inc (Star Online, 2018). Also a survey in 2018 by PricewaterhouseCoopers on Malaysian companies, 48% stated that they had been targeted by cyberattacks in the past two years (PwC, 2018). Moreover, the array of customer data and information as stored by fintechs is similarly at risk of misuse. Finally, the risks of money laundering and terrorist financing must also not be ignored as fintech may be exploited for illegal activities (Griffin, 2018, Kovas, n.d).

Accordingly, regulation and a conducive legal environment are necessary to mitigate the particular risks relating to fintechs.

At the same time, over-regulation can stifle innovation and the benefits associated with such technology; thus, a careful balance must be struck between the two. Consequently, Malaysia has introduced regulations or provisions expressly to mitigate such risks while simultaneously encouraging innovation in the field of fintech related services.

The objective of this chapter is to explain the steps taken by Malaysia's financial regulators to deal with fintech based companies, critically review the regulations, and lastly, to offer recommendations and suggest some specific ways forward.

BACKGROUND

The Malaysian financial industry is governed by two regulators: the Central Bank or Bank Negara Malaysia (BNM) which governs *inter alia* banks, Islamic banks, insurance companies, takaful operators, and money service businesses; and the SC which regulates and develops Malaysia’s capital markets. Also falling under the jurisdiction of BNM are fintech activities dealing with traditional and investment banking (both Islamic and conventional), insurance/takaful, money changing, remittances, the operation of payment systems, and the issuance of payment instruments.

Both organizations have actively issued regulations to cater for the proliferation of fintech businesses. For example, BNM introduced a provision to deal with digital currency exchanges and another enabling electronic-know your customer requirements (e-KYC) for fintech companies facilitating remittances. Another step taken by BNM was to initiate a regulatory sandbox for fintech businesses. Likewise, the SC issued a digital investment management framework to allow licensed portfolio management companies to provide digital investment management services following fulfilment of the requirements listed therein. Furthermore, the SC also introduced a comprehensive regulatory framework to facilitate ECF, P2P, and digital asset exchanges (DAX) to regulate the offering and trading of digital assets, and the Digital Currency and Digital Token Order.

All these regulations were issued to encourage innovation in the industry, manage disruptions, mitigate risks, and facilitate consumer protection (see Table 1).

Table 1. Provisions issued by the regulators in Malaysia

Regulations Issued by BNM	Regulations Issued by SC
Anti-Money Laundering and Counter Financing of Terrorism (AML/CFT) – Digital Currencies (Sector 6) ('Policy Document on Digital Currencies')	Guidelines on Compliance Function for Fund Management Companies SC-GL/CGL-2005 (R3-2018) ('Digital Investment Management Framework')
Anti-Money Laundering and Counter Financing of Terrorism (AML/CFT) – Money Services Business (Sector 3) (Supplementary Document No 1) ('Policy Document on e-KYC')	Capital Markets and Services (Prescription of Securities) (Digital Currency and Digital Token) Order 2019 PU(A) 12/2019 ('Digital Currency and Digital Token Order')
Financial Technology Regulatory Sandbox Framework ('Regulatory Sandbox Framework')	Guidelines on Recognized Markets SC-GL/6-2015(R2-2019) ('Guidelines on Recognized Markets' covering ECF, P2P, and DAX)

Source: (Bank Negara Malaysia, 2019; Securities Commission Malaysia, 2019a)

REGULATIONS ISSUED BY BANK NEGARA MALAYSIA

Policy Document on Digital Currencies

The Anti-Money Laundering and Counter Financing of Terrorism (AML/CFT) – Digital Currencies policy (Sector 6) or the Policy Document on Digital Currencies was issued in late February 2018 by BNM. In summary, it is directed at businesses involved in converting digital currencies to money and *vice versa* (digital currency exchanges) which although not licensed or regulated by BNM, are “reporting institutions” under the Anti-Money Laundering, Anti-Terrorism Financing and Proceeds of Unlawful

Activities Act 2001 (AMLA). This means digital currency exchanges are required to provide detailed information on the buyers and sellers of such currencies.

To expand, the policy document defines digital currencies as a digital representation of value that:

- Functions as a medium of exchange; and
- Is interchangeable with any money but is not electronic money

Electronic money refers to the digital representation of fiat money (Financial Action Task Force, 2014). The policy document is applicable to any persons providing the following services:

- The exchange of digital currency for money;
- The exchange of money for digital currency; or
- The exchange of one digital currency for another, whilst carrying on a digital currency exchange business or otherwise.

Thus, reporting institutions are digital currency exchanges doing business in a digital currency (i.e. a medium of exchange that is convertible to fiat money). These digital currency exchangers are not licensed or regulated by BNM, neither are they recognized as legal tender under the policy document. However, such exchanges must be incorporated and comply with the provisions of the Companies Act 2016 of Malaysia.

Under the policy document, reporting institutions must ensure that they:

- Send a declaration of their details to BNM;
- Assess risks relating to anti-money laundering (AML) and terrorist financing (TF);
- Verify the identity of clients through customer due diligence;
- Identify and assess the AML and TF risks that may arise in relation to the development of new digital currencies, products, services, and business practices;
- Put in place management information systems;
- Keep records which must be maintained and stored for at least 6 years;
- Appoint a “fit and proper” compliance officer who is based in Malaysia; and
- Submit suspicious transaction reports when certain suspicious circumstances arise.

Enforcement measures can be taken against the reporting institution, its directors, officers, and employees for non-compliance in accordance with ss 22, 66E, 86A, 87, 88, 92, and 93 of the AMLA.

Comments on the Policy Document on Digital Currencies

The purpose of the policy document is clear – it ensures that the risks associated with AML and TF are mitigated at digital currency exchanges by the identification and collection of customer data and transactions. Also, an adequate management information system must be installed by the reporting institution. The authors reiterate the importance of such a system and recommend that the improved speed of currency exchange transactions must be commensurate with the speed at which fraud or other malpractice is identified and reported.

Regulating FinTech Businesses

Risk mitigation is furthered by the fact that the policy document applies to digital currency exchanges whether they have a physical presence in Malaysia or not. Digital currency exchanges need only send a declaration of their details to BNM which means it may not be the responsibility of the regulatory body to determine whether reporting institutions are offering services to Malaysian citizens. However, as seen below, if digital currency exchanges are deemed digital asset exchange platforms, SC registration will be required. As such, BNM's role would only entail monitoring AML and TF risk. Therefore, digital currency exchanges may have the dual obligation of reporting to two regulators, the SC and BNM.

A major plus point of the policy document lies in its enforcement powers against reporting institutions and their staff in the event of non-compliance with its provisions.

Policy Document on Electronic-Know Your Customer

On 30 November 2017, BNM issued its Anti-Money Laundering and Counter Financing of Terrorism (AML/CFT) – Money Services Business (Sector 3) policy document (or its Policy Document on e-KYC) outlining the minimum requirements that must be observed to implement e-KYC as applicable to remittance businesses using online and mobile channels. E-KYC refers to the identification of customers via electronic means without the need for physical or face-to-face identification.

Unlike digital currency exchanges, online and mobile remittance providers are regulated by BNM under Malaysia's Money Services Business Act 2011 so long as they transfer legal tender. According to the policy document, a licensed remittance provider under the Money Services Business Act 2011 is a "reporting institution" and as such will be required to obtain prior written approval from BNM to implement e-KYC for online or mobile remittances. Thereafter, the following requirements must be fulfilled:

- The board of the reporting institution must ensure proper policies and procedures are in place to address any specific risks associated with implementation of the e-KYC;
- A reporting institution should, on a continued basis, demonstrate that the e-KYC identification and verification methods are at least as good as face-to-face customer verification processes; and
- The systems and technologies developed by reporting institutions should be capable of supporting processes and procedures required for AML or TF compliance programmes.

A reporting institution should also ensure:

- Remittance transactions can only be performed by a person with a valid bank account;
- Individuals can only remit up to a total of MYR30,000 a day;
- Remittance by foreign workers is limited to a maximum total per day of MYR5000; and
- The existence of robust IT security controls including ensuring a customer's remittance account is tied to only one mobile phone device.

Comments on the Electronic-Know Your Customer Policy Document

With this policy document, fintechs can now provide e-KYC which, in turn, allows customers to remit funds faster and at a lower cost, thereby enabling remittance providers to work more efficiently since all verifications and procedures may now be done online in a matter of minutes. Accordingly, it is no longer necessary for customers to be physically present at financial institutions to remit funds. At the

same time, this permission is coupled with safety features to prevent money laundering or terrorist financing risks by the tracking of remittances. An example of a fintech utilizing e-KYC is MoneyMatch Sdn Bhd which provides remittance and money exchange services. Beginning operations in May 2017, the company describes itself as a fully digital peer-to-peer currency exchange platform that reduces costs for remittance and money exchange services (MoneyMatch, 2018).

Further advancements in this area could include requiring e-KYC for other financial services beyond money service businesses (McKenzie, 2017), for example, takaful related services. Also, to further strengthen the e-KYC framework, it is imperative to enact a legal framework for national digital identification and its use by third parties in Malaysia. This area requires further research and will be discussed below.

Regulatory Sandbox Framework

The Financial Technology Regulatory Sandbox Framework was introduced on 18 October 2016 to enable innovation of fintech to be deployed and tested in a live environment within specified parameters and timeframes (Bank Negara Malaysia [BNM], 2016). The framework allows companies to launch their services without having to comply with the full spectrum of regulations and determines how participants will be considered for placement under the sandbox (Risen, 2017). BNM also created a unit called the Financial Technology Enabler Group (FTEG) to oversee the entry of technological innovations in financial services. According to FTEG, seven participants have been approved to operate within the sandbox although one has since ceased participation (Financial Technology Enabler Group, 2017). According to paragraph 1.5, the considerations are:

- The potential benefits of the proposed product, service, or solution;
- The potential risks and mitigating measures; and
- The integrity, capability, and track record of the financial institutions or fintech companies.

As regards eligibility, participants must demonstrate the following according to paragraph 5.1 of the framework:

- That the product, service, or solution is genuinely **innovative** with a clear potential to:
 - Improve accessibility, efficiency, security, and quality in the provision of financial services,
 - Enhance the efficiency and effectiveness of Malaysian financial institutions' management of risks, or
 - Address gaps in or open new opportunities for financing or investments in the Malaysian economy;
- That the applicant has conducted an adequate and **appropriate assessment** to demonstrate the usefulness and functionality of the product, service, or solution and has identified the associated risks;
- That the applicant has the **necessary resources** to support testing in the sandbox;
- That the applicant has a **realistic business plan** to deploy the product, service, or solution on a commercial scale in Malaysia after exiting the sandbox;
- That the provision of the product, service, or solution is either wholly or **partly incompatible with laws**, regulations, or standards administered by the bank; and

Regulating FinTech Businesses

- That the applicant is led and **managed by persons with credibility** and integrity.

The above highlighted words summarise the framework's purpose to promote innovation in the financial industry while simultaneously mitigating its risks. Under the framework, BNM also provides that participants must assess the potential risks to financial institutions and consumers that may arise from the testing of the product, service, or solution and propose appropriate safeguards to address said risks. BNM may also require participants to furnish reports during the 12 month test period which can be extended upon application.

Upon completion of the testing, BNM will decide whether to allow the product, service, or solution to be introduced to the market on a wider scale. If approved, the participant will be required to comply with the relevant licensing, approval, and registration criteria under the relevant banking laws.

Alternatively, BNM may revoke an applicant's approval to participate in the sandbox at any time before the end of the testing period or it may prohibit deployment of the product, service, or solution at the end of the testing period. In any event, if the participant is prohibited from introducing its product or its participation is revoked, the participant must provide the following safeguards under paragraph 10.4. It must:

- Immediately implement its exit plan to cease provision of the product, service, or solution to new and existing customers;
- Provide notification to customers informing them of the cessation and their rights to redress where relevant;
- Comply with obligations imposed by the bank to dispose of all confidential information;
- Compensate any customers who have suffered financial loss arising from the test; and
- Submit a report to the bank on the actions taken under paragraphs 10.4(a)-(d) within 30 days of the revocation.

Comments on the Regulatory Sandbox Framework

The authors contend it is necessary to further clarify consumer protection in the event a participant in a sandbox ceases operations because it has been revoked or because it failed to gain BNM approval. Such details include avenues for redress in the event participants fail to comply with the framework safeguards. For example, certain questions arise including would a customer of a participant in a sandbox be entitled to dispute resolution under alternative avenues? Additionally, while the benchmark to be used for such compensation must be provided in the framework, will other remedies also be available to consumers? All these issues must be addressed appropriately by the framework.

REGULATIONS ISSUED BY THE SECURITIES COMMISSION MALAYSIA

Digital Investment Management Framework

The Guidelines on Compliance Function for Fund Management Companies SC-GL/CGL-2005 (R3-2018) or the Digital Investment Management Framework were first issued by the SC on 15 March 2005 and were last revised on 17 December 2018 (6th revision). Including thirteen chapters, the framework

was issued pursuant to s 377 of the Capital Markets and Services Act 2007 (CMSA) and outlines the requirements to be complied with by any person intending to establish or carry out portfolio fund management activities in Malaysia. The framework replaces both the Guidelines on Compliance Function for Fund Managers and the Guidelines on Reporting Requirements for Fund Managers. Accordingly, it aims to establish adequate controls and compliance mechanisms to safeguard investor protection and market confidence, whilst also ensuring fund management activities are carried out in compliance with regulatory requirements.

Chapter 13 introduces additional requirements relating to digital investment management companies. According to the SC, these lay out licensing and conduct requirements for companies offering automated discretionary portfolio management services to investors (Securities Commission [SC], 2017). **Digital investment management** refers to fund management businesses incorporating innovative technologies into their portfolio management services (SC, 2017). In addition to the duties stipulated by the framework, the board of directors must ensure the company has the technological capability and support to undertake such a business. It must also:

- Have sufficient understanding of the rationale, risks, and rules behind the algorithm underpinning the digital investment management business;
- At all times, ensure the outcomes produced by the algorithm are consistent with the company's investment strategies;
- Be commensurate with the risk profile of the investor and comply with securities laws and relevant guidelines;
- Have the system to support the digital investment management business including maintaining a secure environment pursuant to the Guidelines on Management of Cyber Risk and other relevant guidelines; and
- Conduct at least an annual review of the effectiveness of its governance and supervision of the technology and algorithm underpinning its business.

In addition to the responsibilities outlined in the framework, the compliance officer's responsibility includes establishing a compliance programme taking into consideration the unique and specific aspects of the digital investment management's business model. Further, a digital investment management company's risk management framework must include any other risks related to the business.

Such companies must also disclose and display prominently on their platforms:

- Any relevant information relating to the company including that an algorithm is being used;
- Its function;
- The assumptions and limitations of the algorithm;
- The risks inherent in the use of such technology;
- The direct and indirect fees, charges, and other remunerations related to the services provided;
- The investment strategies used and any future changes to the strategy; and
- Information about complaints handling or dispute resolution and its procedures.

Moreover, a digital investment management company must provide in writing to the client complete and accurate information of all investments including any unique features, characteristics of investments, and the nature of underlying assets (if any) to enable customers to make informed investment decisions.

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Furthermore, the company must obtain the client's prior approval, explain general and specific investment risks including but not limited to pricing, liquidity, and any rights, obligations and attribution of ownership under investment policies or recommendations, prior to the first transaction undertaken on the client's behalf. Subsequent changes to the information specified must be reflected in its reporting to its clients at least on a quarterly basis and the company must also report the performance of each client's portfolio against appropriate benchmarks, any changes in risk (if any) which may affect the client's investments, and any impact on the client's capital and earning of the investment arising from the change in risk.

On top of that, a digital investment management company must establish, implement, and maintain written policies and procedures which include ensuring the algorithm is monitored and tested to confirm it is fit for purpose at all times. Additionally, it must ensure that access to and the ability to make changes to the algorithm is limited to authorised personnel only. Similarly, ongoing due diligence towards any third party developing, owning or managing the technology and algorithm utilised by the company is necessary.

Where the trust account is maintained under an omnibus structure, a digital investment management company must ensure that co-mingling of assets at the custodian or issuer of assets level is confined to clients of the same company. In terms of naming conventions, 'clients' accounts' or 'clients' trust accounts' are maintained in substitution of unique client identifiers. Further, clients must agree to have their assets held under an omnibus structure, be notified of the risks of having their assets held under such a structure, and be notified that they may not be subject to the same protection conferred to assets held on a segregated basis. Likewise, clients must also be made aware of information relating to the custodial arrangement, that the custodian conducts reconciliation of the trust account on a daily basis against third-party records, maintains records to enable identification of assets to the digital investment management company, and immediately credits into the trust account all proceeds and revenue generated from client investments in the company.

Comments on the Digital Investment Management Framework

The Digital Investment Management Framework is comprehensive, even including additional requirements relating to digital investment companies. It is essential to note that under this framework robo-advisory firms may obtain a licence. Although the phrase 'robo advisory' is not specifically used, clearly such firms are covered by the framework because, according to s 2.05(3) of the Licensing Handbook (SC, 2018), anyone carrying on the business of fund management and incorporating innovative technologies into automated discretionary portfolio management services, will be granted a licence for fund management in relation to portfolio management as a digital investment manager. It also states that holders of a capital markets service licence (CMSL) as regards portfolio management including digital investment management companies and boutique portfolio management companies, may provide investment advisory services to clients, pursuant to an advisory mandate (SC, 2018).

DIGITAL CURRENCY AND DIGITAL TOKEN ORDER

The Capital Markets and Services (Prescription of Securities) (Digital Currency and Digital Token) Order 2019 PU(A) 12/2019 or the Digital Currency and Digital Token Order was published on 8 January

2019 and came into effect on 15 January 2019 under the powers conferred by s 5 of the Capital Markets and Services Act 2007 to Malaysia's Minister of Finance. Under this order, digital currency refers to:

- A digital representation of value which is recorded on a distributed digital ledger whether cryptographically-secured or otherwise;
- That functions as a medium of exchange; and
- Is interchangeable with any money, including through the crediting or debiting of an account.

A digital token refers to a digital representation which is recorded on a distributed digital ledger whether cryptographically-secured or otherwise.

It would appear the order's definition of digital currency is similar to the one offered by BNM's Policy Document on Digital Currencies (see above) except it includes the term "which is recorded on a distributed digital ledger whether cryptographically-secured or otherwise." This effectively means all blockchain-based digital currencies will fall within the definition. Digital tokens are differentiated from currency only in that they are not exchangeable for money, i.e. they are not mediums of exchange.

The order contains a total of 5 parts including when digital currencies and tokens are to be prescribed as securities and the application of requirements under securities laws.

Digital currencies and tokens will be prescribed as securities: if traded in a place or on a facility where offers to sell, purchase, or exchange such currencies are regularly made or accepted; a person expects a return in any form from the trading, conversion, or redemption of the digital currency or an appreciation in its value; and where they are not issued or guaranteed by any government body or central banks as may be specified by the Commission.

A digital token that represents a right or interest of a person in any arrangement made for the purpose of, or having the effect of, providing facilities for the person: where the person receives the digital token in exchange for a consideration; the consideration or contribution from the person, and the income or returns, are pooled; the income or returns of the arrangement are generated from the acquisition, holding, management or disposal of any property or assets or business activities; the person expects a return in any form from the trading, conversion, or redemption of the digital token, or an appreciation in the value of the digital token; the person does not have day-to-day control over the management of the property, assets, or business of the arrangement; and the digital token is not issued or guaranteed by any government body or central banks as may be specified by the Commission, **is prescribed as a security** for the purpose of the securities laws.

Thus, the provisions of securities laws shall apply to such digital currencies and tokens with the exception of Division 3 of Part VI (prospectus) of the Act. Finally, for the purpose of securities laws, digital currency and tokens prescribed as securities that are offered or traded on or through a recognized market cannot be shares in or debenture of, a body corporate or an unincorporated body, or units in a unit trust scheme, or a prescribed investment scheme.

Comments on the Digital Currency and Digital Token Order

Issuance of this order simply indicates that the primary regulatory authority for digital currencies and tokens is the SC. In the first week of March, the SC also issued a separate consultation paper on the offering of digital assets via initial coin offerings (ICO) (discussed below). In addition, the guidelines on recognized markets have been amended to accommodate a digital asset exchange or DAX. The ef-

fect of this order is that anyone intending to make available digital currencies and tokens must seek the prior approval of the SC, then register a disclosure document with it. Further, anyone dealing in digital currencies and tokens as a business must be licenced by the SC.

However, it is essential to note that a crypto asset is only a security if used in the specific ways detailed (Pikri, 2019). This was clearly stated by Chin Wei Min, the Executive Director of the SC, when he was asked whether all types of digital assets were to be considered securities. He stated crypto assets would only become securities if they met, fulfilled, or displayed the characteristics listed in the order (Pikri, 2019). Only then would tokens be considered as securities (Pikri, 2019). Accordingly, Pikri (2019) noted that a digital asset's status in this regard would be based on how it is used. For example, if Bitcoin is traded, it falls under the purview of securities law. However, if that same Bitcoin is used to pay for a packet of nasi lemak, it will not be captured under the order and will therefore not be considered a security (Pikri, 2019). Chin Wei Min also affirmed that a person expecting returns in any form from trading, converting, or redeeming a token, or from an appreciation in its value will be regulated by the SC (essentially making it a DAX as discussed below) (Pikri, 2019).

GUIDELINES ON RECOGNIZED MARKETS

The Guidelines on Recognized Markets SC-GL/6-2015(R2-2019) were first issued on 11 December 2005 and revised on 31 January 2019 (2nd revision). Issued by the SC pursuant to s 377 of the Capital Markets and Services Act 2007 (CMSA), they must be read together with subdivision 4, division 2 of Part II of the CMSA. Part F encompasses equity crowdfunding and peer-to-peer lending platforms while Part G deals with additional requirements relating to DAX.

The term 'recognized market' covers alternative trading venues, marketplaces, or facilities bringing together purchasers and sellers of capital market products. The guidelines set out the registration requirements of **recognized market operators** (RMO) and any ongoing requirements applicable to them. A RMO must be structured as a body corporate unless specified otherwise by the SC. Although the guidelines do not specifically define a RMO, it can be understood that any body corporate operating an alternative trading venue, marketplace, or facility bringing together purchasers and sellers of capital market products such as equity crowdfunding platforms, peer-to-peer lending platforms, or DAX will constitute RMOs.

Significantly, the level of regulation for recognized markets is less stringent than those applying to approved markets. However, terms and conditions may be imposed on the RMO commensurate with the risk profile, nature, and scope of proposed recognized market operations.

Malaysia is the first country in Asia to regulate digital fundraising mechanisms, in particular equity crowdfunding and peer-to-peer lending (Goh, 2016). The guidelines below are specific to the digital fundraising mechanisms of equity crowdfunding, peer-to-peer lending, and digital asset exchanges, and are in addition to the requirements stated above. It should be noted that where an Islamic capital market product is offered on or through the recognized market, the RMO must also appoint a Shariah adviser.

Equity Crowdfunding Platforms

Covered by Chapter 13, Part F of the Guidelines on Recognized Markets, equity crowdfunding platforms or ECF enable individuals to invest in early stage companies and small and medium enterprises (SMEs)

in exchange for a share in the company. ECF platforms are fintechs which provide an alternative venue for SME and early stage company fundraising with paid-up capital of not more than MYR5 million. RMOs operating an ECF platform must ensure due diligence is carried out on companies submitting their online profiles and funding campaigns as the risks involved are higher than investment in established companies listed on stock markets.

The following are some of the conditions that must be adhered to under Chapter 13:

- **Investment Limits**
 - Retail investors can invest a maximum amount of MYR5,000 for each company and MYR50,000 a year in total crowdfunding investment
 - ‘Sophisticated’ investors face no restrictions on investment amounts
 - Refers to persons falling within any of the categories of investors set out in Part 1, Schedules 6 and 7 of the CMSA and includes venture capital corporations, venture capital management corporations, private equity corporations, and private equity management corporations registered with the SC
 - ‘Angel’ investors may invest a maximum of MYR500,000 a year
 - Refers to individuals who are tax residents in Malaysia, whose total net personal assets exceed MYR3 million or its equivalent in foreign currencies, whose gross total annual income is not less than MYR180,000 or its equivalent in foreign currencies, or who, jointly with his or her spouse, has a gross total annual income exceeding MYR250,000 or its equivalent in foreign currencies
- An **ECF operator** is defined as a RMO who operates an **ECF platform**
 - An ECF platform is defined as an equity crowdfunding platform registered by the SC
 - All ECF operators must be locally incorporated
- An **Issuer** is defined as a person who is hosted on an ECF platform to offer its shares
 - The **amount of capital** an issuer can collect through crowdfunding is limited to MYR5 million while SMEs can crowdfund any amount up to MYR3 million in a year
- Any fraud committed in crowdfunding activities will fall under s 179 of the Capital Markets and Services Act 2007 carrying a jail term of not more than 10 years and a minimum fine of MYR1 million
- **Obligations of ECF Operators**
 - In addition to the obligations specified in Chapter 6, ECF operators must carry out due diligence on prospective issuers planning to use its platforms
 - Operators must ensure the issuer’s disclosure document is verified for accuracy and made accessible to investors through the ECF platform
 - Operators must inform investors of any material adverse change to the issuer’s proposal including any of the following matters:
 - the discovery of a false or misleading statement in the disclosure document in relation to the offer;
 - the discovery of a material omission of information required to be included in the disclosure document;
 - a material change or development in the circumstances relating to the offering or the issuer;
 - that fundraising limits imposed on the issuer are not breached; and

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- that investment limits imposed on the investor are not breached.
- The scope of the due diligence exercise by an ECF operator shall include taking reasonable steps to conduct background checks on the issuer to ensure the fit and properness of the issuer, its directors, senior management and controller, and verifying the issuer's business proposition

Peer-to-Peer Financing Platforms

P2P financing platforms are digital platforms connecting SMEs and early stage companies needing investor financing. Unlike ECF, investors in a P2P platform do not receive a share or ownership in the business but rather act as its creditors. Their advantage lies in the fact that companies and SMEs get funding from a source other than banks at lower rates with no need of collateral (Malay Mail, 2017).

Chapter 14 under Part F of the Guidelines on Recognized Markets covers P2P financing platforms. The main points are listed below:

- **Investment Limit**
 - Sophisticated and angel investors (defined above) face no limits on investment
 - Retail investors are limited to MYR50,000 in any period of time
- **Islamic Investment**
 - While P2P financing involves investors lending money and receiving an interest, Shariah compliant P2P financing platforms utilize different mechanisms known as Islamic investment notes
 - An Islamic investment is defined as any contract, agreement, note, or other document evidencing undivided ownership or investment in any assets complying with Shariah principles and concepts endorsed by the Shariah Advisory Council, and that is executed or offered, on or through an electronic platform where an investor expects a financial return, but does not include any right, option or interest in respect thereof: a cheque, banker's draft or any other bill of exchange or a letter of credit; a banknote, guarantee or a takaful policy; or a statement, passbook or other document showing any balance in a current, deposit or savings account.
- **Issuer**
 - Defined as a person seeking funding on or through a P2P platform
- **P2P Operator**
 - Defined as a RMO who operates a P2P platform which is an electronic platform that facilitates directly or indirectly the issuance, execution, or offering of investment notes or Islamic investment notes
 - Must apply for registration under these guidelines
 - Must be locally incorporated and have a minimum paid-up capital of MYR5 million

Digital Asset Exchanges

Digital asset exchanges or DAX are covered under Chapter 15, Part G of the Guidelines on Recognized Markets. The main points are as follows:

- **DAX**

- Refers to an electronic platform facilitating the trading of a digital asset
- **Digital Asset**
 - Refers collectively to a digital currency or token which has the same meaning assigned to it as in the Digital Currency and Digital Token Order
- **DAX Operator**
 - Refers to a RMO operating a DAX
 - All DAX operators must be locally incorporated and have a minimum paid-up capital of MYR5 million
 - The SC may at any time impose additional financial requirements or other terms and conditions on the DAX operator commensurate with the nature, operations, and risks posed by said operator
 - If a DAX operator is a public company, at least one member of the board must be an independent director
- **Conflict of Interest**
 - The DAX operator's framework on conflicts of interest must include policies and procedures relating to, amongst other issues:
 - proprietary trading by the DAX operator on its platform;
 - trading in digital assets by its officers and employees on its own or other platforms;
 - the management of non-public material information; and
 - the offering of any digital asset to be traded on its platforms.
 - DAX operators are prohibited from providing direct or indirect financial assistance to investors, including its officers and employees, to invest or trade in digital assets on its platform
 - DAX operators should identify possible sources of operational risk, both internal and external, and mitigate their impact through the use of appropriate systems, policies, procedures, and controls
 - Such systems should be designed to ensure a high degree of security and operational reliability including having adequate capacity
- **Operational Risk Management**
 - In this regard, a DAX operator must:
 - establish a robust operational risk management framework with appropriate systems, policies, procedures, and controls to identify, monitor, mitigate, and manage operational risks;
 - have in place clearly defined roles and responsibilities for addressing operational risk;
 - have in place clearly defined operational reliability objectives and policies designed to achieve such objectives;
 - ensure it has adequate capacity proportionate to stress volumes to achieve its service-level objectives; and
 - have comprehensive physical and information security policies that address all potential vulnerabilities and threats.

Comments on the Guidelines on Recognized Markets

The Guidelines on Recognized Markets provide a framework for the operation of ECF and P2P financing platforms, and DAX to safeguard investors and operators of digital assets. The amended guidelines

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followed the coming into force of the Digital Currency and Digital Token Order on 15 January 2019 and applies to any person interested in operating a digital asset platform (Rosli, 2019). A digital currency exchange that is a reporting institution under the Policy Document on Digital Currencies is deemed a DAX and will therefore have to be registered as a RMO with the SC.

According to the SC's official website, currently there are three general RMOs: Bay Supply Chain Technology Sdn Bhd, Bursa Malaysia Bonds Sdn Bhd, and Citibank Berhad (SC, 2019b).

Presently, the following companies are registered as RMOs of ECF platforms: Ata Plus Sdn Bhd, Crowdo Malaysia Sdn Bhd, Eureeca SEA Sdn Bhd, FBM Crowdtech Sdn Bhd, Funnel Technologies Sdn Bhd, Pitch Platforms Sdn Bhd, and Crowdplus Sdn Bhd (SC, 2019b). Registered RMOs of P2P financing platforms include: B2B Finpal Sdn Bhd, Ethis Kapital Sdn Bhd, FBM Crowdtech Sdn Bhd, Modalku Ventures Sdn Bhd, Peoplender Sdn Bhd, and QuicKash Malaysia Sdn Bhd (SC, 2019b).

As regards DAX, 22 companies have been registered as such. These are: AES Signatum Berhad, Arbor Digital Sdn Bhd, B4U EXC (M) Sdn Bhd, Belfrics Malaysia Sdn Bhd, Bitpoint Malaysia Sdn Bhd, BLOKMY Sdn Bhd, Chako Global Sdn Bhd, EZYTRONICS Sdn Bhd (World Cloud Ventures Sdn Bhd), FINX Blockchain Sdn Bhd (FINX Capital Sdn Bhd), GetCoinApp Sdn Bhd, GiGaex Sdn Bhd, Luno Malaysia Sdn Bhd, MCP International Sdn Bhd, MX Global Sdn Bhd, PinkExc (M) Sdn Bhd, Sinegy Technologies (M) Sdn Bhd, MBAEX Online Pte Limited (Tezatech Sdn Bhd), Tokenize Technology (M) Sdn Bhd, UDAX International Sdn Bhd, Upbit Malaysia Sdn Bhd, Vardiz Commerce Sdn Bhd, and Xbit Asia Sdn Bhd (SC, 2019c).

Paragraph 1.03 makes it clear that all RMOs must be a body corporate or a limited liability partnership meaning RMOs should be registered either under the Companies Act 2016 or the Limited Liability Partnerships Act 2012. Accordingly, Hong (2018) concludes that unlike other jurisdictions, societies or non-profit organisations *per se*, such as many promoted on Kickstart, will not be eligible to become RMOs in Malaysia. Another point to note is that since RMOs are not public companies, they are not obliged to publicly disclose their financial reports. Hong (2018) believes that at the moment the law does not allow societies or non-profit organisations to operate ECFs. As such, he states there is need to enact a framework to govern non-equity crowdfunding.

As regards digital assets, a joint statement was issued by the SC and BNM to provide clarity on the regulatory approach for the offering and trading of digital assets in Malaysia (BNM and SC, 2018). It stated that the SC will regulate issuances of digital assets via ICOs and the trading of digital assets at DAX in Malaysia. At the same time, ICO issuers and DAX involved in the issuance or dealing of digital assets with a payment function must comply with relevant BNM laws and regulations relating to payments and currency matters. In addition, ICO issuers and DAX are subject to the SC's Guidelines on Prevention of Money Laundering and Terrorism Financing.

Thereafter, on 6 March 2019, the SC issued a public consultation paper (No 1/2019) on the proposed regulatory framework for the issuance of digital assets through an ICO inviting written comments from the public (SC, 2019d). Excluding the overview, the consultation paper consists of five parts:

1. Introduction;
2. Definition of an ICO;
3. The risks associated with ICOs;
4. The need for regulation; and
5. A proposed regulatory framework (SC, 2019d).

Paragraph 4.1 states that the current lack of an ICO regulatory framework exposes investors to a number of risks such as those associated with an ICO issuer not having a physical presence in Malaysia, fraud, manipulation, money laundering and terrorist financing, the general risks associated with start-ups, and cyber security risks. ICO issuers are therefore required to mitigate the risks posed to safeguard investor protection and promote confidence in the ICO market.

Paragraph 5.2 declares that to mitigate incidences of fraud whilst protecting market integrity, the SC will adopt a two-pronged approach entailing, first, an authorisation for the offering or issuance of the ICO, and second, registration of a disclosure document (or whitepaper) necessitating compliance with SC prescribed minimum requirements. The whitepaper should encompass brief information on the ICO issuer including, where applicable:

- The group structure and details of material entities within the group;
- The details and profiles of the board of directors/senior management team/promoters;
- A brief description of the shares and/or digital tokens held by the board of directors/senior management team/promoters;
- The objective or purpose and timeline of the ICO, including detailed information on the underlying business/project to be managed and operated by the ICO issuer;
- A business plan, including a detailed description of the sustainability and scalability of the underlying business/project;
- The targeted date for each major phase in the business/project;
- The targeted amounts to be raised through the ICO;
- A scheduled timeline for the utilisation of the proceeds including the details of each utilisation;
- Any rights, conditions, or functions attached to digital tokens issued from the ICO including any specific rights/privileges/benefits attributed to a digital token holder;
- Details of the independent custodian, escrow agents, or entity acting in the capacity of a trustee;
- Discussions on the determination of the price per digital token including the valuation methodology and reasonable assumptions adopted in such calculations;
- Financial information including audited financial statements or management accounts (where applicable);
- A detailed technical description of the protocol, platform and, or application, as the case may be; and
- The associated benefits of the technology and details of the associated challenges and risks including any conflict of interest and related party transactions.

According to the consultation paper, an ICO issuer may raise funds calculated as a multiple of 10 times the amount of shareholder funds and subject to a ceiling of MYR100 million. Proceeds should be subject to BNM's exchange controls meaning at least 50% must be utilised in Malaysia and if the ICO is asset-backed, at least 50% of the assets must be based in Malaysia. Further, an ICO issuer should only be able to withdraw monies based on the milestones disclosed in their whitepaper.

Moreover, an ICO issuer must be a locally incorporated company and carry out its main business in Malaysia with a minimum paid up capital of MYR500,000, and it must not be publicly listed. However, public listed companies are allowed to establish a separate entity to carry out an ICO to prevent potential impact on the company's price, valuation, and shareholder rights. In addition, the board of directors and

senior management must collectively hold 50% equity in the ICO issuer and retain it for 18 months to ensure their commitment to its success.

Drawing from its experience in regulating ECF and P2P financing, the SC also proposed formation of a third party platform to host and assess ICOs, similar to SMEs hosting their notes on platforms such as pitchIN and Funding Societies. Additionally, it proposed the host be regulated as a RMO. Finally, the framework explores the possibility of permitting certain SC recognised individuals to conduct assessments.

Having discussed the SC and BNM regulations, this chapter will now critically review the regulations discussed above.

CRITICAL REVIEW OF THE REGULATIONS

The introduction to this chapter raised unique concerns from the literature in relation to the use of fintechs. These concerns apply to all fintechs whether offering Shariah compliant solutions or otherwise. The following section will review the regulations issued by BNM and the SC to assess whether those concerns have been addressed.

As mentioned previously, the concerns are speed, safety, and illegal activity. Transactions carried out through fintech occur quickly, thus, the speed at which malpractice and fraud by external parties is reported should occur just as swiftly. Further, fintech systems must be safe from cyberattacks while simultaneously protecting customer user data. Finally, risks from money laundering and terrorist financing must also be mitigated. While the authors acknowledge other vulnerabilities or concerns may arise with the introduction of fintechs, this research will focus on the above mentioned issues and analyse whether they have been adequately addressed by the regulations, the results of which are illustrated in Table 2.

Thus the table above summarises whether the various regulations addressed the following factors:

- The need for service providers to report malpractice;
- The need to report malpractice or whether systems are required to give timely reports on malpractice or irregularities;
- The need for service providers to have in place adequate cyber security systems to prevent hacking and other cyber threats; and
- The risks of money laundering and terrorist financing and whether such risks have been addressed through the detection and reporting of suspicious activities.

BNM's policy document on digital currencies contains extensive provisions on the risks associated with money laundering and terrorist financing. In addition, it requires service providers to report malpractice and irregularities whilst having in place a management information system to report irregularities within a timely manner. However, the policy document neglects to mention the need for cyber security systems or arrangements to protect customer data.

While the policy document on e-KYC enabled the prompt identification of customers and the mitigation of risks associated with money laundering and terrorist financing, provisions requiring customer data protection, cyber security, and the timely reporting of malpractice were not similarly included.

The Regulatory Sandbox Framework requires applicants to provide an interim report on any fraud and for applicants and the BNM to decide on the frequency and specific details of said report. Further, the applicant must identify potential risks including money laundering and terrorist financing, protect the

Table 2. Examining BNM and SC issued regulations

	Policy Document on Digital Currencies	Policy Document on e-KYC	Regulatory Sandbox Framework	Digital Investment Management Framework	Digital Currency and Digital Token Order	Guidelines on Recognized Markets
Reporting malpractice	Must report √	X	√	X	X	The SC may issue a direction regarding the requirement to submit periodic reports to the SC
Timely identification of malpractice	System must give timely information √	X	X	X	X	X
Cyber security system in place	X	X	Applicant to identify potential risks and propose safeguards	Maintain a secure environment pursuant to the Guidelines on the Management of Cyber Risk and other relevant guidelines	X	Maintain secured environment pursuant to the Guidelines on the Management of Cyber Risk and other relevant guidelines
Protection of consumer personal data	X	X	Applicant to identify potential risks and propose safeguards	X	X	Establish and maintain policies and procedures to ensure compliance with all relevant laws, regulations, and guidelines including the Personal Data Protection Act 2010
System in place to detect risks of money laundering and terrorist financing	√	√	Applicant to identify potential risks and propose safeguards	Company's risk management framework must also include any other risks	X	Establish and maintain policies and procedures to ensure compliance with all relevant laws, regulations, and guidelines

Source: (Bank Negara Malaysia, 2019; Securities Commission, 2019a)

confidentiality of customer information, and promote the safety, reliability, and efficiency of payment systems and payment instruments. The applicant may also propose appropriate safeguards to address the identified risks.

While the Digital Investment Management Framework provides no definite provisions on timely malpractice reporting or the need to protect customer data, it does contain provisions to ensure systems are in place to counteract cyber security threats, money laundering, terrorist financing, and other risks.

The Digital Currency and Digital Token Order does not provide for any of the issues highlighted in the table above; however, securities laws will apply to digital currencies and tokens prescribed as securities leaving them subject to other SC regulations.

The Guidelines on Recognized Markets encompass provisions on all the concerns raised except the timely reporting of external malpractice to the SC. Broad provisions require RMOs to comply with all SC regulations and parliamentary legislation, thus ensuring risks are mitigated and concerns are raised.

Significantly, the SC has issued separate provisions on cyber risks (the Guidelines on Management of Cyber Risk 2016) which are applicable to all capital market entities. As such, the guidelines lay out the

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roles and responsibilities of the board of directors and management as regards cyber risk, require capital market entities to have cyber risk policies and procedures, require entities to have comprehensive strategies and measures to manage cyber risk including its prevention, detection and recovery, and require reports of breaches to occur on the day of the cyber incident to the SC. Hence, it can be seen the guidelines are comprehensive and help to cover the risk posed by cyber threats even if individual regulations do not.

BNM also issued an Exposure Draft on Risk Management in Technology (RMiT) to provide guidelines and standards to BNM licensed financial institutions on risks relating to technology including cyber threats. Therefore, similar to the aforementioned provisions, even though individual BNM regulations may not require the use of cyber security systems, the exposure draft will cover such incidences.

In other words, both the SC and BNM have introduced provisions requiring adequate cyber security systems be put in place to counteract such threats.

SOLUTIONS AND RECOMMENDATIONS

Resulting from the critical review above, the authors make the following comments and recommendations.

- Aside from the Policy Document on Digital Currency, the Regulatory Sandbox Framework, and the Guidelines on Recognized Markets, other regulations do not specifically provide that malpractice and fraud from external sources should be reported to regulators. It is, therefore, recommended by the authors that all such regulations should include this provision.
- Time periods within which to report fraud and malpractice are not specified by the majority of regulations. Accordingly, it is recommended a time frame be provided considering the nature of the fintech business.
- The protection of personal data has not been provided for by the regulations. While Malaysia does have legislation to protect personal data (Personal Data Protection Act 2010), such provisions may not be suitable to cover the unique features of fintechs. Because it is beyond the scope of this chapter for the authors to examine this Act, it is recommended that further research be conducted to analyse the need for other special provisions as regards the personal data of consumers.
- To further strengthen the e-KYC framework, it is imperative to enact a legal framework to enable the use of national digital IDs and their usage by third parties in Malaysia. Avoiding potential disputes in this regard will entail a framework of trust at the national level.
- All fintechs, whether conventional or Islamic, must comply with the regulations discussed above. The Guidelines on Recognized Markets also require Islamic fintech RMOs to have a Shariah advisor but it has yet to be determined whether other special provisions may be necessary to ensure complete Shariah compliance of fintech. While the authors contend that further provisions appear unnecessary, additional research may be conducted in this regard.
- The Policy Document on Digital Currencies does not specifically state that digital currency exchanges are DAX under the Guidelines on Recognized Markets. It is therefore recommended that the former should contain this provision. Such DAX would then require registration with the SC.
- The Policy Document on e-KYC currently only applies to remittance fintech companies. Consequently, it is recommended the provision be expanded to other types of business such as certain takaful products.

- It is also recommended the Regulatory Sandbox Framework include details on avenues for redress in the event participants fail to comply with framework safeguards. Moreover, a benchmark for compensation should be suggested.
- Not all digital assets listed in DAX will be Shariah compliant. That being so, to inform investors, it is imperative to introduce a Shariah screening methodology specific to digital assets which is cognizant of the Shariah compliance of digital assets.

FUTURE RESEARCH DIRECTIONS

This research recommends four types of future research be conducted in this area of study. First, future research needs to focus on whether the Personal Data Protection Act 2010 is sufficient to address issues relating to the risk of abuse of personal data by fintechs, and if not, what provisions should be inserted to protect said data.

Second, further research must be conducted to determine the need for other special provisions, aside from requiring a Shariah advisor to instruct the RMO, to ensure Shariah compliance of fintechs.

Third, extra research needs to be carried out to enact a framework for national digital IDs and their use by third parties in Malaysia. With the dawn of the fourth industrial revolution and swift developments in technology-based financial transactions, it is becoming ever more crucial to switch to a national digital ID system. In addition, the scope of such a system's use by third parties requires specification.

Finally, because digital assets are a new concept, it is essential Muslim investors be confident of Shariah compliance to enable informed investment. Therefore, it is necessary to conduct additional research to establish a Shariah screening methodology for digital assets to inform investors about the Shariah compliance of DAX-listed digital assets.

CONCLUSION

Malaysian financial regulators have taken the bold step of issuing regulations to ensure risks are mitigated in this digital era. This chapter has examined six pieces of regulation issued over the past three years in Malaysia with the BNM covering the banking sector and the SC overseeing capital markets. All regulations apply to fintechs whether offering conventional or Islamic solutions.

BNM issued regulations on digital currencies, e-KYC systems for remittance companies, and a regulatory sandbox framework for fintech start-ups. Each ensured innovation in the following ways. First, regulating digital currencies allowed for their trading even though such currencies are not recognized as legal tender. Next, the e-KYC as regards remittance companies permitted the use of online boarding and verification thus allowing the companies to offer faster and cheaper services. Finally, the regulatory sandbox framework allows fintech start-ups to test their products in a controlled yet less regulated environment. All these innovations were encouraged under the watchful gaze of BNM to ensure the mitigation of risks associated with money laundering and terrorist financing.

Similarly, the SC issued regulations on digital investment management companies incorporating innovative technologies into portfolio management services, recognized market operators operating alternative trading venues, and marketplaces or facilities bringing together purchasers and sellers of capital market products, in particular ECF, P2P, and DAX platforms, and digital assets comprising of digital currency

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and digital tokens. Significantly, the SC is the first regulator in Asia to form and issue regulations on ECF and P2P platforms and one of the earliest to issue directives on the classification of digital assets. Digital assets—digital currencies and tokens meeting the characteristics of the Digital Currency and Digital Token Order—are now considered securities and must abide by the laws and regulations applying to securities. Moreover, the SC regulations take into account the need for innovation – for example, less stringent levels of regulation apply to recognized markets than approved markets. At the same time, guidelines to ensure transparency and investor protection are also provided for.

Having reviewed the regulations issued by BNM and the SC, further improvements to the guidelines are recommended below. Overall, the regulations demonstrate the following points.

- Risks associated with money laundering and terrorist financing have been addressed by the regulations.
- Risks associated with cyber security and the personal data of consumers have not been addressed. However, it would appear that separate regulations issued by BNM and the SC may cover cyber security risks while personal data in Malaysia is covered by the Personal Data Protection Act 2010. Nevertheless, further research is required to investigate the extent to which said legislation is sufficient to protect customer data.
- Timely malpractice reporting from external sources to regulators seems omitted by most, if not all, the regulations. It is recommended provisions be inserted to address this omission.
- All fintechs, whether conventional or Islamic, must comply with the regulations discussed above. The Guidelines on Recognized Markets require Islamic fintech RMOs to have a Shariah advisor. Questions arise as to whether there is a need for other special provisions to ensure complete Shariah compliance of fintech. The authors contend not but recommend additional research be conducted in this regard.
- Not all the digital assets listed in DAX will be Shariah compliant. As such, to inform investors about Shariah compliance of digital assets, introduction of a Shariah screening methodology specific to digital assets is imperative. Further, this methodology must be formulated taking into account the nature of digital assets.

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KEY TERMS AND DEFINITIONS

Bank Negara Malaysia (BNM): The Central Bank of Malaysia which governs banks, Islamic banks, insurance companies, takaful operators, money payment systems, and money service businesses.

Digital Asset: Collectively refers to a digital currency or digital token.

Digital Asset Exchange: An electronic platform which facilitates the trading of a digital asset.

Digital Currency: A digital representation of value that functions as a medium of exchange and is interchangeable with any money but is not electronic money.

Digital Investment Management: A fund management business which incorporates innovative technologies into portfolio management services.

Digital Token: A digital representation which is recorded on a distributed digital ledger whether cryptographically-secured or otherwise.

Electronic Know Your Customer (e-KYC): Identification of the customer through electronic means without the need for physical or face-to-face identification.

Equity Crowd Funding Platform (ECF): FinTechs which provide an alternative venue for the raising of funds for SMEs and early stage companies with a paid-up capital of not more than MYR5 million.

Recognized Market Operator (RMO): A body corporate that operates an alternative trading venue, marketplace, or facility that brings together purchasers and sellers of capital market products.

Peer-to-Peer Financing Platforms (P2P): Digital platforms that connect SMEs and early stage companies requiring financing with investors.

Securities Commission (SC): Regulator that regulates and develops Malaysia's capital market.

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Chapter 19

Inclusive Disruption: The Role of Financial Technologies in Filling Financial Inclusion Gaps in Russia

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ABSTRACT

This chapter discusses the important socioeconomic role of financial technologies in the emerging market which is Russia today. While the issues of financial inclusion are of recognized importance for the developing markets, until recently they were seen largely as areas of affirmative regulatory action, not of competitive play by private market actors. However, the advent of fintech companies changes the paradigm. Many fintech companies in Russia view the gaps in financial inclusion as attractive market niches and formulate relevant consumer offers. This chapter reviews their strategic approaches based on the study of five business cases, and introduces an analytical matrix mapping the approaches to existing inclusivity gaps. The model strengthens the existing policy aimed at developing financial inclusion as it allows a targeted cost-benefit analysis of market players' actions. As Russia demonstrates many of the financial inclusivity challenges seen in other countries, the findings of this chapter have certain applicability in the context of both emerging and advanced economies.

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INTRODUCTION

Financial inclusion arguably lies at the foundation of economic inclusion, where finance is recognized as a backbone of any modern economic system. The access to modern financial instruments such as accounts, transfers, deposits and loans may not only bring immediate economic benefits to consumers, but also largely define their capabilities to pursue effective economic activity either through employment or through entrepreneurship. In this case financial services work as infrastructure systems like roads or communications networks, which are obvious public goods. What makes modern financial services unique is that their suppliers can legally discriminate between customers, refusing to provide services, either implicitly (through price barriers) or explicitly. Explicit discrimination is inherent in the current procedures of bank lending, where the supplier judges the ability of a customer to make certain future action (repayment of loan) through a proprietary process, which is largely non-transparent to the customers and the results of which are commonly irreversible for the affected customer. As was said, such discrimination is of broad consequence, as it not only precludes some customers from gaining immediate economic benefits, but also limits their ability to operate as actors within the modern market economy. While the system of discrimination is absolutely necessary within the current approaches to risk management in financial systems, it has unwanted social side effects, which are especially manifest in lower income economies.

Within this context the issues of financial inclusion are largely viewed as being a key to the overall agenda of inclusive growth. According to World Bank, financial inclusion is defined as the state when *all interested individuals and businesses have access to useful and affordable financial products and services that meet their needs delivered in a responsible and sustainable way* (World Bank, 2013). Financial inclusion can be considered as the key enabler of reducing poverty, as has been shown by empirical research, in that it improves macroeconomic indicators including economic development and stability (Beck et al., 2007). However, as seen from the definition, financial inclusion (or its absence) is a complex phenomenon, which may include various combinations of barriers: physical, social, economic, legal, etc.

Practically in every country of the world the traditional banks are not reaching the whole of financially active population, creating groups of “financial exclusion”. The size of these groups relative to the population and the reasons for exclusion differ widely, mostly correlating with the overall state of economic development. For instance, in the low income developing countries up to 80% of the population can be excluded mostly due to poverty and lack of financial infrastructure. In the advanced countries the excluded groups would comprise some 10 to 15% of the population, and the reasons for exclusion would be more complex (Demirgüç-Kunt et al., 2015).

Whatever the reason, solving the problem of exclusion was usually viewed as requiring affirmative action stimulated by the policies of the national financial regulators. However, the advancement of the modern financial technologies companies, the so-called fintech, gave a new perspective to the issue, allowing the forces of a free market to fill many of the niches which had not been covered by traditional banks. Such examples include, for instance, the Kenyan M-Pesa, AliPay in China, Digibank in India. Here is the arena of disruption in the financial services markets: providing products which cannot be profitable if offered by the traditional banks to the customers against whom the traditional banks tend to discriminate. One can see obvious social benefits coming from such disruption (on top of the economic gains for the customers and suppliers), however, like in any disruption there are important risks. The worst-case scenario can be the degree of disruption of the overall financial system, which will make it unprofitable for most of the incumbent players to operate, following which the system will lose stability

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and the trust of all participants. This scenario is unlikely to develop in full, however it is generally kept in mind by the relevant regulatory bodies, like national Central Banks and their international associations.

Thus, from a scholarly perspective the key question is: will the private actors of financial technology (“fintech”) working in the generally free market environment create enough of the social effects of financial inclusion without generating unacceptable social and economic risks? Finding the answers will advance our knowledge of how regulated markets work. It will also be of high practical importance for national and international decision making on the approaches to the issue of regulation of the new disruptive business models. Answering this question requires, among other things, an understanding of the possible motives and strategies of the entrepreneurs who provide fintech products to the market. One way to obtain an understanding is by case studies, verified and enriched by offsite analysis of statistical data.

Russia is, in a sense, a model case for the development of inclusive disruptive financial technologies as it combines certain aspects of financial inclusion of both developing and advanced economies. Russia is an upper-middle income country, with a mostly urban population, almost compulsory primary literacy and a high share of skilled employment (IMF, 2016b). The penetration of modern communication technologies such as the Internet and mobile communications is above average, though the bandwidth is often lower than in the most digitally advanced countries. Russia commands a vast pool of talent in digital technologies, being one of the world’s leading producers of students of mathematics, programming and engineering.

At the same time, the country’s geography creates certain pockets of population that are difficult or unprofitable to access with a traditional banking infrastructure, and the tightening of bank risk policies during the recent economic recession has led to a growing withdrawal of banks from operations involving the lower income strata. Also, due to the historic legacy of the Soviet era, when the consumer finance services in the country were rudimentary, the population has a relatively low level of experience and understanding of modern finance, especially in the middle- and older age strata.

This peculiar situation requires a country-specific model of financial non-inclusivity, which serves as a basis for analysis. The model outlines segments of non-included population based on different barriers to inclusivity, such as physical (remote areas, disabled persons), social (lower income strata, self-employed, migrant workers, etc.), competences and skills (elder ages, undereducated), and SMEs (small and medium enterprises) financial services (especially for businesses in the early stages of development). Various issues of inclusion emerge in relation to different types of financial services: payments and transfers, loans, deposits, insurance, etc.

The resulting segments differ in the number of participants, size of opportunity and cost of action to overcome the barriers. Modeling by segment allows for targeted cost-benefit analysis of possible measures aimed at increasing financial inclusion. While in some segments the existing market actors are more or less effective with their current operations, other segments require strong affirmative actions. So, based on this overview, analysis of some specific business cases suggests a way to target the pockets of financial exclusion in Russia by fintech.

It is important that fintech companies should see filling the “inclusivity gaps” as one of the factors that shape their business strategies, actually as guidance to the available market niches. From the perspective of fintech companies, there are four primary domains of action, corresponding to the financial “mechanics” underlying the business model: (1) make payments more accessible for customer-to-business (C2B); (2) facilitate payments in the business-to-business (B2B) segment, including small businesses; (3) make credit more accessible; and (4) provide mass-scale financial advice, including personal budgeting.

The existing inclusivity gaps and the view of fintech companies on the core domains of action form sort of a matrix mapping the fintech effects on financial inclusion in Russia; this matrix can be adapted to other markets, both emerging and advanced.

Thus, the objectives of this Chapter are the following:

- Study the background for the role of technologies in the financial inclusion phenomenon based on international experience.
- Review the financial inclusion gaps and controversies in Russia.
- Study five financial technologies business cases aimed at covering particular exclusivity pockets.
- Build a specific business model based on a dual-dimensional “inclusivity-gaps–business strategy” matrix.
- Discuss business strategy and policy implications based on the model developed.

FINANCIAL TECHNOLOGIES AS A DRIVER FOR FINANCIAL INCLUSION: BACKGROUND OVERVIEW

By the end of 20th century there came a common understanding that economic growth, as manifested in the increase of GDP per capita, cannot by itself achieve all the social goals of humanity. As the important gaps among the nations and even within the nations in terms of quality of life were expanding, a new concept of “inclusive” growth was developed and adopted leading to a series of economic, social and political reforms. Involvement of the population in financial services arose as an important element of the new policy as it became clear that it might be a crucial element for the successful growth of other spheres: the development of the financial sector is associated not only with overall economic growth, but also with more equal distribution of its benefits in the society (Delis et al., 2013).

Following this idea, the “financial inclusion” phenomenon emerged as a political issue in 1997 in the United Kingdom and was discussed worldwide in 2010, when the Global Partnership for Financial Inclusion (GPII) was created (Financial Inclusion Commission, 2017; GPII, 2017). The latter has become an integrating platform for coordinating the efforts of all participating countries to improve financial accessibility as a factor of socioeconomic development. The joint work of this group resulted in the development of a comprehensive definition of financial inclusion, which goes beyond having an account in a bank, as well as its complex classification which includes access, quality, usage and welfare dimensions.

Additionally, a number of policy papers and action plans in financial inclusion all over the world were introduced aimed at solving the problems in each of the dimensions of the above classification (Arun & Kamath, 2015). Although practical actions towards financial inclusion do not have a long history yet, empirical research has revealed a list of positive microeconomic¹ and macroeconomic² effects in favor of the hypothesis that the growth of inclusive financial systems is a significant component of general development progress.

Among other drivers, such as proper regulation and policies, technology stands out as a clear enabler of financial inclusion because it can solve the associated issues for all types of economies including low-income, advanced and developing. Traditionally, the technological development in the financial sector was led by the “licensed banks” as national regulators generally discouraged financial intermediation on

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a large scale by other types of institutions. However, in recent years the global phenomenon of fintech – innovative technological solutions in finance sphere – has become prominent.

Actually, fintech in its early forms originated in 19th century, with the invention of the telegraph in 1838 which became the fundament for financial globalization. Then, first credit cards (1950) and ATMs (1967) were introduced. This step is described by Arner, Barberis and Buckley (2015) as the “analogue-to-digital” stage. From 1967 to 2007 “development of traditional digital financial services” took place, with the establishment of Clearing House Interbank Payments System (1970), the Society for Worldwide Interbank Financial Telecommunications (Swift) (1973), online brokerage (1982) and the ubiquitous penetration of Internet banking in major USA banks (1998). After almost a decade during which there were no major financial innovations, the era of “democratizing digital financial services” began in 2008, and brought fintech in its contemporary form: electronic money, mobile banking, blockchain, etc. (Arner, Barberis & Buckley, 2015).

So, in recent years the financial technology industry has developed rapidly. A number of successful cases of an increased access to safe and affordable financial services through fintech solutions expanded the diversity of products as well as lowered the costs associated with the usage of financial services. As EY’s Fintech adoption index shows, in 2017 the average percentage of digitally active consumers regularly using fintech services reached 33% across the surveyed 20 markets, compared to 16% in 2016 (EY, 2017).

This, in turn, leads to the disruption in the traditional banking model. As shown by the PricewaterhouseCoopers survey (2016), 80% of respondents consider consumer banking is likely to be disrupted by fintech by 2020. In addition, some 60% and 40% respectively of respondents also considered fund transfers/payments and investment/wealth management as being highly likely to be disrupted.

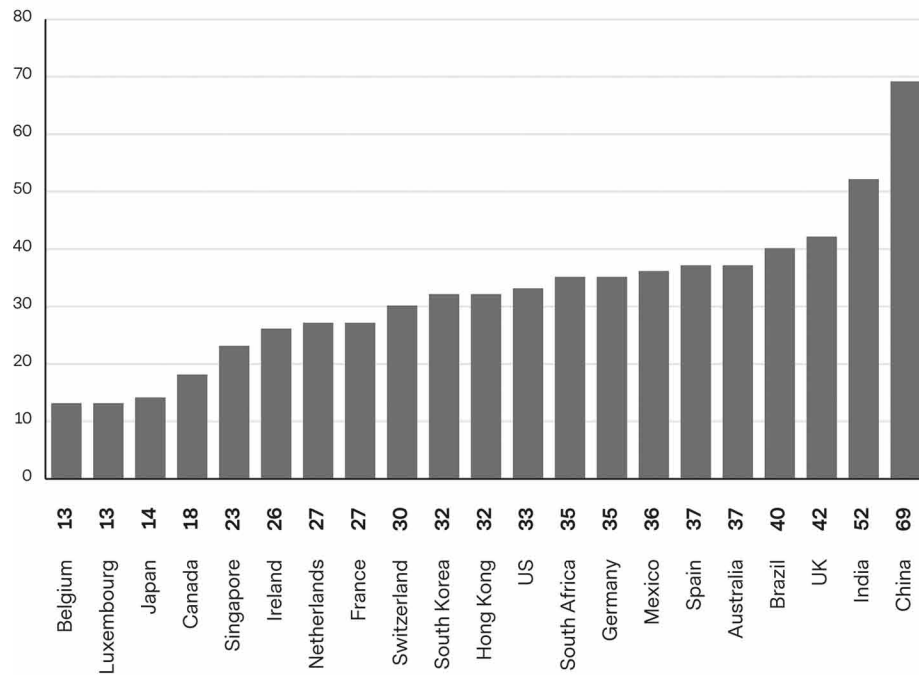
In order to examine the role of digital channels and technologies in inclusivity in more detail, several cases worldwide have been considered, and analyzed by the level of economy development and income levels.

High-Income Economies

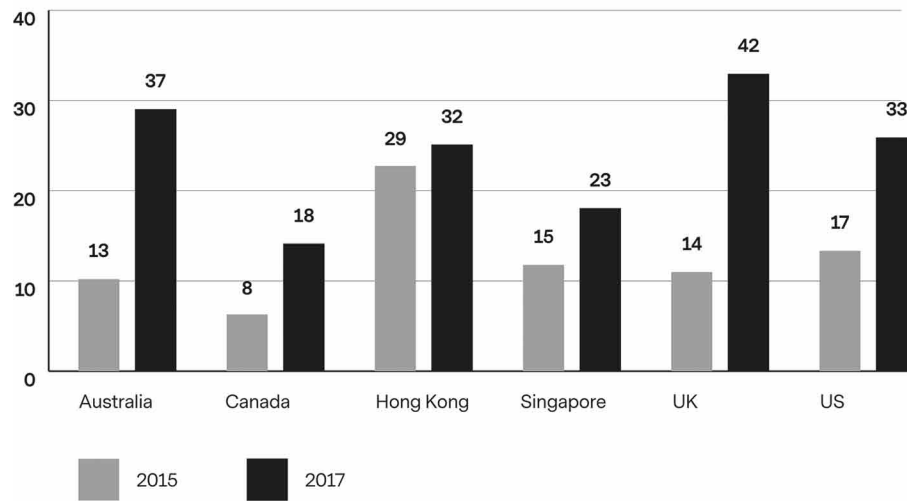
Overall the high-income economies serve as benchmarks of financial inclusion for other nations. Still, while financial inclusion in advanced economies has increased significantly over the past years and almost reached 100%, innovations in the financial industry help to build on these positive trends and allow consumers who already have bank accounts to access innovative new products that can improve their overall financial health. For instance, the amount of fintech startups in the U.S. reached 2,000 in 2016, with a sufficient number of platforms working towards involving excluded segments of consumers (i.e. Autism Expressed, a learning platform teaching marketable skills to empower individuals with disabilities such as autism); helping to reduce the cost of serving low- and moderate-income users (like Benefit Kitchen, a benefit screening and financial literacy tool that provides eligibility information to low-income families; PYT Funds, a debt reduction model for student loans); and expand access to safe and affordable products (for example, eCredable, a platform for consumers without credit connecting them to affordable financial services). Moreover, there is a list of fintechs from advanced economies aimed at improving financial inclusion in low- and lower-middle income countries, such as money transfer services SimbaPay from the United Kingdom working with African countries or Lenddo based in Singapore, ascertaining financial stability of customers from Latin America, South Asia and South East Asia.

Figure 1. Comparison of fintech adoption in 2015 vs 2017 and progress of fintech adoption in 2017, measured as share of population regularly using fintech
 Source: (EY, 2017)

Progress of fintech adoption in 2017



Comparison of fintech adoption in 2015 vs 2017



Low- and Lower-Middle Income Developing Economies

In these countries financial and general economic exclusion is prevailing in the society for a number of reasons. There is a lack of physical infrastructure, on the one hand, and a large proportion of population cannot afford the costs of traditional banking products, on the other. This stimulates the development of financial technologies that work across weak infrastructure and provide products at a very low cost - the so-called “microfinance” (Korovkin, 2014). Digital channels like mobile banking (m-banking) are likely to provide better coverage and more cost-effective services to the unbanked population of low- and lower-middle income economies. Conventional banking might not be cost-effective for low-ticket-size transactions; hence, financial inclusion might not be feasible. The most well-known example of an m-banking solution is M-Pesa, a mobile payment service in Kenya, Tanzania and some other markets which is operated through a private telecommunications provider with a nationwide coverage independent of traditional banks. M-Pesa provides financial services to more than 75% of Kenyans (Sangeetha & Koushik, 2015). In India, the government has been supporting the development of a viable, large-scale digital ecosystem since 2009 through Aadhaar, a unique biometric identification aimed at pushing state benefits through digital channels (Parussini, 2017).

Upper-Medium Income Developing Economies

Similar to the low- and lower-middle income economies, in the upper-middle income developing economies (more often referred to as the “emerging markets³”), the field for the application of financial technologies as a solution to financial inclusion is wide. Due to the large number of problems of both supply and demand, fintech has huge opportunities to improve the situation. All sectors of financial services are covered by inclusive fintech solutions, including Payments (for instance, e-money in Peru, cashless governmental benefits through South African Social Security Agency in South Africa), Merchant services, Insurance, Lending (for example, an Argentinian bitcoin and digital payments startup BitPagos which has a consumer credit product, enabling those with limited banking history to get credit through the use of its consumer wallet service), Personal finance/savings (like personal finance application GuiaBolso from Brazil), Money transfers, Tools for Financial Institutions (Association of Banks, 2016). The range of technologies underlying the solutions are also wide, including mobile and internet, contactless and NFC payments, electronic money, cloud systems, bitcoin, etc. (Bourreau & Valletti, 2015). Still, the problem that developing markets face is that the market players have strong incentives to focus on the relatively broad base of an affluent population, and are thus less motivated to fill the pockets of financial exclusion, compared to the low-income markets. The combination of these opposite issues – a sufficient number of underserved groups of population and relatively high financial risks of working with them compared to serving the affluent population – makes this group of countries particularly interesting for a more detailed analysis.

Summing up all the cases of inclusive fintech worldwide, the four main advantages of fintech in promoting financial inclusion are of note:

1. As the review of international cases shows, fintech is penetrating all types of traditional banking operations, using a number of technologies and innovations which give financial technologies a certain advantage in covering the gaps in financial inclusion that are inaccessible to banks, by de-

veloping access and usage of financial services, and improving their quality, suitability and welfare effect.

2. Interoperability and open application programming interfaces (APIs) of most solutions make inclusivity an intrinsic feature of fintech. Due to open APIs, it is possible to utilize the same technology for a range of inclusion problems in many countries because it allows small innovators to develop, test and refine services for consumers at a very low cost and develop good solutions relevant for the particular inclusivity issue based on a shared technology or platform.
3. Compared to traditional financial services, fintech solutions provision is not limited to only 'licensed' operators as there may be parallel or alternative financial institutions among fintech players including fintech start-ups and digital companies. The latter drive innovation and boosts financial inclusion in places where traditional financial institutions have reached their potential, which is often the case in the advanced economies (Breloff & Parker, 2011), while in low-income economies, mobile operators take on the role of financial institutions. At the same time, while large banks still remain key players influencing financial inclusion development in emerging economies, technologies often disrupt their traditional business models compelling them to place digitalization at the center of their strategy to stay profitable (Cheston et al., 2017).
4. Fintech easily adapts to the existing infrastructure, as it utilizes a wide range of technologies, from mobile technologies, which are already developed even in most low-income countries, to more sophisticated ones involving blockchain. At the same time, it can drive improvements in the financial infrastructure through development and growth.

DIGITAL FINANCIAL INCLUSION BACKGROUND IN RUSSIA

Economic inclusivity in Russia is one of the important issues of socioeconomic development. The report by the World Economic Forum on the overall economic inclusivity released in 2017 puts the Russian Federation among the more inclusive of the emerging economies (number 13 out of 78), yet labels it as "slowly advancing" (Samans et al., 2017). The report also notes that Russia's inclusivity position is lower than its GDP ranking, suggesting that there is significant room for improvement. As was discussed above, financial inclusivity is an essential part of the overall inclusivity of socioeconomic system and is currently of high priority in Russia.

As was said, there are basically two groups of barriers to financial inclusion, physical and socioeconomic. The former depends largely on the size of the country and the density of its population, as it is definitely more effective economically to create infrastructure for compact populations. The latter barriers are more manifest in the lower income countries. Thus, to understand the relative level of development of Russian financial services, the country – which is vast geographically and belongs to upper-middle income economies – should be compared to two sets of peers. First, the large-size countries with a relatively low population density, like the USA, Argentina, Canada, Australia and Mongolia – for the comparison of the development of banking infrastructure such as the number of branches, ATMs or POS terminals for payment cards. Secondly, countries that are close in GDP per-capita, like Israel, Portugal, Malaysia, Kazakhstan, Chile - for the comparison of the penetration of banking services, such as the share of population with bank accounts and debit cards.

In general, the 2015 survey results show that between 26%⁴ and 66%⁵ of the population is not included in formal financial services at all (National Agency for Financial Studies & BDO, 2016; Central Bank

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of Russia, 2016). Nevertheless, the analysis of statistics on access points for banks branches, ATMs, payment terminals, client service standards and the price of financial products and services shows that there are no general problems with accessibility of the financial infrastructure. For example, in 2016, Russia had about 17,000 financial organizations including 834 banks with more than 44,000 branches with the average density of 38 bank branches per 100,000 people. While in Canada, Australia, and Argentina, countries with large territories and uneven population density and social demographic structure, this indicator is 23.6, 28.7 and 13.2 branches per 100,000 people, respectively (see Table 1). It follows that there is no apparent correlation – either direct or inverse – between the size of the country and its density of population and the degree of development of its financial infrastructure.

Table 1. Data on access to financial infrastructure in 2016; population density comparable countries

Country	Area, km ²	Population Density, by km ²	Branches, per 100,000 Adults	ATMs, per 100,000 Adults	POS Terminals, per 100,000 Adults
Russia	17,098,242	8.33	38	187	1,117
USA	9,826,675	32.45	32.9	–	2,156*
Argentina	2,780,400	15.47	13.2	61	–
Canada	9,984,670	3.49	23.6	221	2,202*
Australia	7,741,220	2.91	28.7	165	3,939*
Mongolia	1,564,116	1.89	70.4	72.75	448*

*Latest available data is for 2009

Source: (The World Factbook, 2016; National Agency for Financial Studies & BDO, 2016; Central Bank of Russia, 2016; IMF Financial Access Survey, 2016a)

Analyzing countries comparable with Russia by GDP per capita, one can see that based on the penetration of bank accounts, Russia is closer to its less advanced comparables, with 67% penetration level compared to 54% and 63% in Kazakhstan and Chile, respectively. In other countries listed in Table 2 more than 80% of population have bank accounts. As for the penetration of debit cards, the tendency is for moderate to low levels, except for Portugal, which stands out with 67% compared to 32-54% in other countries.

Table 2. Data on penetration of financial services in 2014; GDP per capita comparable countries

	GDP per Capita, in USD Dollars	% of Population With Bank Account	% of Population With Debit Card
Russia	26,100	67%	44%
Israel	34,800	90%	32%
Portugal	28,500	87%	67%
Malaysia	27,200	80%	41%
Kazakhstan	25,700	54%	32%
Chile	24,000	63%	54%

Source: (Factbook, 2016; Demirgüç-Kunt et al., 2015)

Despite the fact that the general level of financial inclusion is moderate and even relatively high compared to emerging countries, at least 26% of population are still unbanked. This figure is further broken down into small groups of excluded, the so-called “exclusivity pockets” or “inclusivity gaps”, due to a number of barriers that might arise due to potential lack of knowledge of financial services, or readiness to use them, distrust in the formal banking system or failure of banks to serve the needs of particular groups of population.

Physical Barriers

Although, on average, Russia outperforms most of the comparable countries in terms of bank branches accessibility, the statistics on distribution of credit organizations by size of the settlement shows that while there are more than 412 organizations per city with more than 1m inhabitants, their numbers are decreasing to 8.5 in cities with the population below 100,000 people, and many small towns and villages – even with several thousands of inhabitants – have no branches at all. This is all due to some special features of demographics in Russia where 68.3% of Russians live in the European part of Russia, which accounts for only 20.66% of the territory. The density of the population in the European part of Russia is 27 h/km², and that in Asia is 3 h/km². Urban population is 74.27% (Rosstat, 2016, 2017).

Moreover, there are infrastructural barriers in the Internet and mobile penetration which are important for the availability of digital financial services. In 2016, the Russian Ministry of Telecommunications reported 27m subscribers to fixed broadband Internet and over 100m subscribers to the mobile Internet (Ministry of Telecommunications of Russia, 2017). As confirmed by consumer research, only 70% of the total population in Russia can go online (FOM, 2017). These distinctive features of Russia’s territorial and urban structure hamper the provision of financial services by traditional financial institutions, often making it impossible for them to set up contact with potential users.

Social Barriers

There is a range of socially unsecured groups of population due to their income or education level, age or disabilities. The population structure in Russia shows a huge disparity in access to social benefits and income inequality. However, the situation is getting better over time, the wealth of the Russian population is growing and so is the demand for appropriate financial services. For example, in Russia, there are 20m people (over 14% of population) close to the poverty line, and for most of them traditional financial services are too expensive or inaccessible, i.e. they do not have an appropriate credit history to be eligible for credit from a bank. This group faces a price discrimination barrier, being unable to bear the costs of traditional financial services.

Retired people form another large excluded group, having both a lower income – less than Rub 15,000 (approx. \$ 250) a month on average – and a lack information about financial products, compounded by gaps in financial competences and skills. Additionally, there are about 10 million working migrants in Russia, who remit their salaries to their families. The volume of remittances to neighboring countries (e.g. Azerbaijan, Kyrgyzstan, Tajikistan) from Russia reaches \$ 20 billion, while the transaction costs charged by traditional providers are very high and include the fee, accessibility and safety of remittances. Social barriers also prevent such groups as students (due to financial instability) and long-term ill or disabled people (because of low accessibility to financial services) from inclusion to financial services. This second type of social barrier, is discrimination by banks based on high operational risks

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expectations: in most banks, operational strategy often deems services for low-income social classes as both commercially unfeasible (i.e. the costs of maintenance of deposit accounts with lower than average amounts are higher than any potential return on the deposited amounts) and risky (for instance, because of the high possibility of loan default).

Competences and Skills

Although, the level of education is high in Russia, with a 99.7% general literacy rate (measured as the percentage of the population aged 15 and older who can, with understanding, both read and write a short simple statement on everyday life) (UNESCO Institute for Statistics, 2016); the 2015 financial literacy survey showed that while 57% of respondents considered themselves financially literate, only about half of the questions were answered correctly (measured as the proportion of correct answers in the test for knowledge of basic financial concepts like inflation, interest rate, etc.) (National Agency for Financial Studies & BDO, 2016). Additionally, about half of the population may be considered financially dependent – based on the same survey, 43% of population get a bank card for their salaries automatically from their employers and due to low financial literacy they might not understand the nature of the card, for example, that it is linked to a bank account. As a result, those people mostly use the card to withdraw cash and are not able to make independent decisions regarding financial services and products (National Agency for Financial Studies & BDO, 2016).

Moreover, by virtue of the law and regulation in Russia, children over 6 are allowed to make small transactions, and adolescents aged 14 to 18 can independently manage their income (earnings, scholarships, etc.). So, this group of more than 22 million school children needs proper financial services in order to transact with money and at the same time accumulate knowledge and experience to be prepared for the modern financial market when they come of age.

Small and Medium Enterprises (SMEs) Financial Services

Last, but not least, there are also exclusivity issues connected not only to personal finance, but also to access to financial services for *small and medium sized businesses*. For example, there are 5,523,765 entrepreneurs (Resource Center of Small Business, 2016) running small and medium businesses in Russia who do not easily fulfill the requirements of the formal financial sector, mainly when it comes to credit, and especially in the early stages of development.

Summing up Table 3 estimations and taking into account the overlapping of inclusivity gaps, approximately up to 43% of the population (62m adults) in Russia are limited in their access to modern financial services for one or more reasons. At the same time, the “pockets of exclusion” happen for a number of reasons and are relatively isolated, thus, no single straightforward measure can be offered to deal with the problem, and the possible impact of affirmative action policy by authorities is limited. On the other hand, private market players may find it an attractive business idea to fill in the existing market gaps. Further analysis will focus on the examples of such cases.

Table 3. Inclusivity gaps in Russia; summary table

Barrier Type	Exclusivity Pocket Type	Causes	Estimated Size of Pocket	
			as a % of Total Population*	in Million People
Physical	Demographic features	Uneven distribution of population. Large disparity between development of urban and village territories	26%	38
	Infrastructural problems	Uneven penetration of mobile and internet network among territories	30%	44
Social	Price discrimination	Disparity in access to social benefits and income inequality	14%**	20
	Discrimination by banks based on high operational risks expectations	Migrant workers using remittance services with high transaction costs	–	10
		Students lacking proper services and experience	5%	7
		Elderly lacking proper services and experience	29%	42
	Long-term ill or disabled people lacking proper services and experience	8%	12	
Competences and skills	Financial independency	Large share of those who have got an account at a bank are through salary card from their employers	43%	63
	Financial Literacy	Disparity of general level of education versus financial literacy, young people aged 6-18 lacking proper services and experience	43%	63
SME Financial Services	Small and medium businesses	Lack of financial services for small and medium businesses, especially in the early stages of development	4%	6

* Total population is 146,804,372 people

**Measured as people having less than the living wage monthly income which was Rub 9,828 (\$160) as of 2016 (\$160)

Source: (Rosstat, 2015, 2016, 2017; Ministry of Education, 2014; FOM, 2017; National Agency for Financial Studies & BDO, 2016; Central Bank of Russia, 2016; IMF Financial Access Survey, 2016a)

FINANCIAL INCLUSION CONTROVERSIES IN RUSSIA

Though usually classified as an “emerging market” the Russian Federation faces inclusivity challenges that are more associated with advanced economies. The population is mostly urban, with almost 100% basic literacy, one of the highest tertiary education enrollment ratios in the world, with a high share of skilled employment and relatively low unemployment. At the same time, due to the historic legacy of the Soviet era, when the consumer finance services in the country were rudimentary, the population has a relatively low level of experience and understanding of modern finance, especially in the middle- and older age strata.

This raises the question on how wide the financial services access should be which is given to a financially illiterate and low-income population in order to overcome social risks. The main problem lies in the expanding availability of credit as the key strategy for increasing banks’ revenues, which in the situation of financial illiteracy can lead to terrible consequences. The subprime crisis in 2008 in the USA as well as India’s 2010 Andhra Pradesh microfinance crisis can be seen as crises of financial inclusion, when uncontrolled growth in access to financial services can contribute to financial disturbances and social discontent (Hannig & Jansen, 2010; Raghuram, 2010). Russia is now facing a similar problem, with the annual growth of ‘bad’ debts of 32% in 2016 (United Credit Bureau, 2016).

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Moreover, there is an additional financial inclusion controversy in Russia in that survey results are ambiguous and indicate a low level of financial services penetration: - for example, two surveys conducted in Russia late in 2015 show different results on “bank account” possession – 44% versus 74% of respondents (National Agency for Financial Studies & BDO, 2016; Central Bank of Russia, 2016). At the same time, the number of cards per capita, at almost 2 per person, is much higher, demonstrating that people do not recognize the relationship between possession of a card and a bank account.

Overall financial non-inclusion in Russia has traits of both advanced economies (relatively rare and separated cases of non-inclusion in specific social groups) and emerging economies (strong disparities between regions in term of development). It is important that in terms of the modern infrastructure like telecommunications Russia definitely belongs to the advanced economies. This peculiar situation requires development of a country-specific model of financial non-inclusivity based on a financial technologies solution which serves as the basis for analysis and strategic planning.

FINTECH MARKET PLAYERS FILLING THE INCLUSIVITY GAPS IN RUSSIA

Online semi-formalized questionnaire interviews of 37 fintech companies shows that 82% of fintech start-ups surveyed self-attributed their services as having a positive effect on financial inclusion, with 54% claiming this effect to be high which shows that the fintech market players are, on the one hand, aware of the existing gaps in availability of financial services (SKOLKOVO School of Management, 2016). At the same time, in their business strategy planning these companies take a different approach, usually starting from the possible technological solution and then developing a financial service, i.e. an offer to the customers. In many cases these offers fill the existing gaps in financial inclusivity. This duality leads to Figure 2.

Figure 2. Some ways in which the fintech companies fill the inclusivity gaps

Source: Authors' analysis

		Type of financial service			
Inclusivity gaps		C2B payments accessibility	B2B payments accessibility	Accessible credit	Financial advice
Physical		Payments through mobile phones, payment cash-in		Peer-to-Peer lending	
SME financial services			Payments at lower transaction costs	Credit products with appropriate terms and conditions for SME and early-stage business	Targeted services for financial consultations
Competences and skills		Micro-payments with low commission, trans-border payments		Credit scoring solution for better loan portfolios	Targeted services for financial education
Social		Easy-to-execute payments		Credit products with transparent terms and conditions	Learning-by-doing financial services and products

Here are five short case-studies of fintech solutions from Russia trying to fill in the niches of financial inclusivity.

Financial Technologies for Cash to Non-Cash Transfers for Remote Areas Underserved by Bank Branches: QIWI Terminals and Wallets⁶

Inclusivity Pocket: Physical Barriers

History of the Problem

As of 2000 the traditional banking system in Russia was still in its infancy, it had no resources to provide the public with proper financial services to cover their needs for payment operations. For example, with a widespread pre-paid mobile phone tariff plans, people looked for an easy and cheap way to top up their phone balance. Although several solutions emerged, including the so-called 'scratch' cards distributed by retail chains, they were unable to provide complete coverage, particularly in the remote areas due to territorial barriers. The solution was in dealing with small individual shops as agents to build a wide network; however, telecoms were reluctant due to concerns over receiving payment.

Technical Solution and Business Model

While searching for a solution to the problem, in 2004 QIWI, a company founded through the merger of a 'scratch' card producer and an instant payments provider, introduced the network of cash-in machines (QIWI, 2017). Any small shop could install these machines, or terminals, operated by QIWI acting as an intermediary in money-collection for telecoms and other partners, including utilities and communal services etc. Each payment is subject to a commission from 0% to 5% depending on the sum. Although not a pioneer in the business of cash-in terminals, the main advantage of QIWI over its competitors was a convenient user interface and the fact that company undertook a risk in expanding its network to work in distant geographic locations and succeeded. In 2017, the company has more than 160,000 cash-in terminals with 56m users monthly, making QIWI terminals network comparable with the ATMs network.

In 2008, as a response to the need of even more convenient payment service, QIWI launched e-wallets with extended functionality compared to the terminals, such as easy access from any device connected to the Internet, payments to any merchant or P2P transactions, and lower fees. QIWI commission ranges from 0% to 0.75% based on the amount and the bank that issued the card that is linked to the wallet. After acquiring a full license, the company launched its QIWI Visa Plastic, enabling the usage of e-money offline. The card's price includes a commission for the issue of 2.5% (but not less than 25 rubles or at least \$1 when buying the card in US dollars). Payments using the card are commission-free. In 2017, there have been about 17m users of QIWI Wallet service.

Benefits and Results

The network of cash-in terminals which are installed even in the remotest and smallest settlements still remains the important solution to the social and physical inclusivity gaps in Russia. At the same time, QIWI's e-money solutions may be integrated by small online retailers' payments, who usually cannot afford expensive and sophisticated traditional services provided by banks allowing them to expand their customer base. Moreover, both terminals and e-wallets are easy to use and either do not require special competences and skills or are characterized by a learning-by-doing feature.

Alternative Credit Scoring for Boosting the Quality of Microfinance Portfolios: Axicredit.ru

Inclusivity Pocket: Barriers for SME Financial Services (Microcredit Organizations), Price Discrimination Social Barriers

History of the Problem

Microcredit plays a dramatically important role in providing underprivileged social groups and remote geographies of Russia with credit. In Q12017, there were about 900,000 microcredits issued (half of the amount of loans in banks issued at the same period), and the demand shows positive dynamics compared to the same period last year – the growth is 8% (United Credit Bureau, 2017). However, recently microcredit has been facing regulatory issues with the introduction of two laws: one limiting the interest accrual and the other the so-called “anti-collection law”, limiting hard methods of debt collection. This raised the question of profitability, as MFOs need a moderate quality loan portfolio together with a less formal credit management, compared to banks, to maintain inclusivity of credit – to remain profitable. In order to be sustainable, the model should not be based on higher risk tolerance, so credit scoring is often managed manually, which is flexible, but expensive, compared to computer-based scoring systems at banks.

Technical Solution and Business Model

Axiomatica, a Russian start-up company launched in 2012, introduced a “cloud technology” approach as a solution to the dilemma. Microfinancial companies get access to the platform called AxiCredit (www.axicredit.ru) providing all the processes of credit management and, in particular, scoring. The FICO Origination Manager Decision Module is a foundation of Axicredit’s credit risk evaluation model. At the centre of the company’s solution is an architectural innovation which introduced a separation of the Scoring Strategy module. This allowed it to make the module’s decision rules transparent and easy to manage directly by clients. By 2017, AxiCredit client list included no less than 10 MFOs and banks, getting revenues from a fee from application processing (about \$1 per application).

Benefits and Results

Despite the fact that technology is fairly novel to the market, the company has already managed to form a base of highly enthusiastic clients both from the microcredit sector and small banks. The benefits are numerous. First, the system can be easily installed and gives high-quality decisions in a short time due to its cloud architecture. Secondly, the platform uses transparent rules, allowing client companies to change their credit acceptance and interest rate criteria in response to a market situation. This allows it to maintain the equilibrium between the liquidity supply, cost and market demand. So, the service is beneficial to small financial companies as well as its potential clients.

Financial Technologies to Manage the Risks of Cash Handled by Children: “Ladoshki” project

Inclusivity Pocket: Competences and Skills – School Children

History of the Problem

In Russia, like elsewhere, parents should either regularly (weekly or monthly) pay or pass cash to their children for nutrition at school in advance or provide the child with cash for every-day purchase of food of the child’s choice at the school cafeteria as well as pocket money for small everyday transactions. Additionally, school children often use public transport to reach the school, so they have to pay for transport in cash as well. However, this obviously has risks for children, often inexperienced in financial services: loss, theft/extortion with associated psychological consequences, and incorrect cash management.

In 2014, the “School Card”, a pre-paid card or bracelet with NFC technology used for payments or pass, identification information and photo of the student, connected to the parents’ internet bank account and SMS alerts was piloted in some regions. It bundles the permit/crossing pass, cashless nutrition and other school payments, cashless transport payments as well as cashless, out of school “pocket money” transactions. Although it showed some benefits and was used by more than 200,000 schoolchildren in 2017, there is a sufficient disadvantage as parents are claiming that children either lose or damage their cards, so that parents should pay for them to be reissued. So, a much better instrument for child’s identification for financial transactions was needed.

Technical Solution and Business Model

In 2015, the project “Ladoshki” based on the biometric technology of payment with the palm of the hand was introduced through a collaboration of pioneers in innovative finance in Russia – the government, a big state bank, an international payments system in partnership with Yandex.Money (the company’s case is discussed further in this Chapter) – with a goal to help schools and parents overcome the risk of cash handled by school children.

To pay, a child simply needs to enter the amount and just place his/her palm on the sensor. It analyzes the palm “print” ie the structure of the capillaries in the child’s palm, and a special optical system integrated in the sensor identifies the payer, after which the amount is automatically deducted from the parent’s account. So, the solution is based on sharing the parent’s bank account with a child. The account, in turn, may be replenished without commission in a variety of ways: by linking the bank card with the child’s hand, and the account will be replenished automatically, via the Internet bank or the bank’s mobile application as well as at ATMs.

This instrument is also free of fraud as biometric data is not stored: palm scans are converted into a digital code, which is transmitted to the data center via secure communication channels.

Benefits and Results

So, by 2017, the “Ladoshki” project has been successfully introduced in at least 150 schools, including schools in cities with a population under 500,000.

Parents point at the benefits of this project: better control over attendance, control over the expenses of the child, convenience in replenishing the card and the possibility of transferring money to the child,

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and even more, ability to pay for their child's nutrition in credit. School children are able, in turn, to use modern payment systems and manage their personal finance, which increases the level of their financial culture and literacy as well as improves security due to the decrease in the use of cash. Bank service providers also claim that parents whose children are involved in these projects also use financial products and services more often and with better understanding. Local authorities have the opportunity to control the funds allocated from the budget for school children. Nutrition organizations and educational institutions, in turn, reduce the turnover of cash, reduce the cost of collection and fraud risk, and have an instrument which helps to plan nutrition menus.

Financial Technologies for Fundraising/Crowdfunding of “Micro-Causes” in P2P and P2B: Yandex.Money

Inclusivity Pocket: Social, Physical, Competences and Skills Barriers

History of the Problem

The ways of peer-to-peer (P2P) money remittances offered by traditional providers are often pricy and/or difficult to access. E-wallets overcome these two major disadvantages allowing money to be sent and received faster and at lower cost. Moreover, the digital revolution in P2P products had a number of significant social effects, for example, crowdfunding: collection of funds from a large number of people for a business project or a cause. Although money contributions from the public using various channels have always been the center of charity organizations' mode of operations, the process used to be connected with excessive management costs. Due to these costs, small organizations and private civil volunteers often gave up fundraising campaigns. This is in contrast to international practice in crowdfunding, where, for example, more than 125,000 projects collected more than \$3bn on the biggest crowdfunding platform Kickstarter.com (a popular American funding platform). The Russian public is not eager to contribute much to early-stage, 'would-be' projects. So, there is a need for a service, which allows to funds to be collected in stages and to show the project's progress in order to raise money for its development.

Technical Solution and Business Model

Yandex.Money, a big financial innovations market player in Russia since 2002, has introduced a number of products for crowdfunding management by both individuals and professional organizations, based on e-money and other digital instruments. The fundamental idea is that fundraising is, of its nature, a social activity, putting communication management on the same level of importance as the transfer of money. The services are integrated into popular social network platforms like Facebook and VKontakte (a popular analogue of Facebook in Russia and the CIS) with posts promoting the cause and eye-catching instruments like instantaneous reporting of the sum collected or progress achieved.

In 2014, the company launched a platform for personal money collection vmeste.yandex.ru (“vmeste” means “together” in Russian), which in 2016 was relaunched as yasobe.ru (an original way of saying “I will raise”). The service allows funds to be raised for a business project, for an art or musical project, for extracurricular activities in a school class or even for a civil urbanist initiative. About 200,000 people visit the yasobe.ru web site monthly.

Moreover, the core Yandex.Money activities, its B2B solution Yandex.Kassa (translated as Cashbox) and Yandex.Wallet also play an important role in crowdfunding. The main goal of Yandex.Kassa is to

integrate all possible means of payment in one stream providing single-source accounting statements. By 2017, it gathered more than 86,000 retailers, both major online market players and the small and micro- businesses including charity organizations. So that one can easily contribute to charity organizations using Yandex services, Yandex.Wallet service enables the remittances of e-money to any private person or business, connected to Yandex.Kassa.

Benefits and Results

A digital crowdfunding service adapted to Russian realities and introduced by Yandex.Money allows getting group financing for small, but important, activities, like microbusinesses, art projects and so-called “microcauses” – private initiatives aimed at contributing for the society. The analysis of the Yandex.Money service shows that, in general, Russians have invested in crowdfunding projects 70% more funds in 2016 compared to 2015. At the same time, the number of those who transfer money to projects through the service doubled - 290 million rubles were collected through Yandex.Kassa and yasobe.ru.

Financial Technologies in Personal Finance Budgeting: Easyfinance.ru

Inclusivity Pocket: Competences and Skills

History of the Problem

As mentioned earlier, Russia has an issue with financial literacy leading to problems with personal budgeting, low skills of usage of financial services and even such severe problems as overborrowing. Based on expert opinion, only 10 to 20% of population want to become financially educated and skilled, and 20% are getting involved, including those who want to possess personal budgeting skills.

Since correlation between financial literacy and usage of financial services is positive and significant, there is a possibility of increasing financial inclusion by providing appropriate solutions to the demand.

Technical Solution and Business Model

Following this idea, the service easyfinance.ru was launched in 2009. Easyfinance.ru combines a personal finance budgeting interface with a financial consultation service based on the expenses and gains listed by the user. In contrast to other personal budgeting solutions, this project is developed as a platform, not just an application. It allows other applications, such as internet-bank applications or other financial services to connect, it has an open APIs, and promotes integration with the ecosystem.

At the beginning, the project was adapted to the Russian reality of the cash economy, providing instruments to keep records easily not only for cashless transactions by cards, for which there is an SMS or Internet-bank reporting, but also for money flows in cash, in contrast to existing solutions in other countries where cashless transactions were more developed. Currently, Easyfinance.ru combines the control of both cash and cashless flows and aggregates information from more than 200 banks for 300,000 clients. There are 4 types of accounts: Free (with no fee), Light Pro, Medium Pro, Full Pro, which differ in price (from \$1 to \$2.5) and the number of available services, such as expanded budget, advanced reports, the ability to synchronize with a mobile application, or online backup. About 4% of users had paid accounts at the end of 2015.

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The service also covers the B2B-segment, providing the banks with financial management solutions, meeting the demand of banks to give value to their clients and deepen the usage of their services by clients, compared to the current situation when loans and deposits are the most popular products.

Benefits and Results

Analysis of service users shows that 55% noticeably improved their financial condition, 25% got rid of debts, and 22% of users achieved their goals within a year of use. Moreover, the clients of Easyfinance.ru showed a tendency to increase the share of cashless transactions to 80% compared to cash (20%). Ability to collect such statistics allows financial services providers to understand better the behavior of users.

Summing up the presentation of successful case studies of digital financial products, a specific model of business can be developed. Such a model is two-dimensional:

- Dimension of “Inclusivity gaps” outlines the segments of non-included population based on different barriers to inclusivity, like physical, social, competences and skills, or institutional as discussed above.
- Type of financial service dimension is the basis on which the fintech solution is built.

Case-studies also show that different market actors are working in each segment to achieve financial inclusion through technological solutions: smaller and regional banks, government-owned banks with an explicit mandate for inclusivity, MFOs and credit cooperatives, telecom operators, fintech companies.

Figure 3. Cases of fintech solutions filling the inclusivity gaps

Source: Authors' analysis

		Type of financial service			
Inclusivity gaps		C2B payments accessibility	B2B payments accessibility	Accessible credit	Financial advice
Physical		QIWI	Yandex.Money		
SME financial services				Axicredit	
Competences and skills		Ladoshki			
Social					Easyfinance

POLICY AND STRATEGIC IMPLICATIONS

In general, despite its significant role, fintech is only part of the financial sector development. There is also a sufficient change in traditional banks' strategies, with fintech's disruptive role as one of the reasons. For banks that incorporate financial inclusion into operations, digital payments become an important gateway to new customers, so that they get involved in technological advancement. As a result, in Russia, the main consumers of fintech are banks competing among themselves for the level of service. Moreover, big new players are emerging as Internet companies and telecoms are becoming banks to a certain extent, issuing bankcards and providing financial services.

Thus, with all these developing technologies and innovations together with the growing number of agents involved in financial markets, there is a need for regulatory approaches that will stimulate the offering of market products that close niches in inclusiveness: physical, social, competences and skills as well as SME financial services barriers, without creating unacceptable risks. Regulation is needed to protect customer funds held inside the digital transactional platforms, support privacy and security of users' financial data, ensure transparency of financial products and services, guarantee proper customer rights as well as provide protection for financial market players against operational risks (CGAP, 2014). One effective solution might be the development of risk-proportional regulatory initiatives in order to manage the disruptive consequences or potential effects on the financial market. Additionally, governments can support the penetration of fintech solutions by introducing them in G2C (government-to-consumer) and G2B (government-to-business) payments (like Aadhaar program in India).

Moreover, currently, there exists an under-estimated feature that technology requires the development of distribution channels. To access digital financial services, access to a mobile connection is important, but it is equally important to be able to convert cash to digital money and, at least for now, back into cash again. So mobile phones have been important in places like Kenya, but the real game changer has been the emergence of large and well-functioning agent networks. So, there is an increasing role for government policies and other market players actions in promoting financial technologies through providing proper infrastructure.

Additionally, following the Russian experience, fintech entrepreneurs from emerging markets, although having brilliant ideas on how to cover the particular financial inclusion gap, often lack proper competences and skills. It could be IT skills, a barrier to product prototype realization, experience in the legal field, necessary for the product to comply with laws and regulations, or business modeling, essential for economical success. Moreover, there is no one approach to access fintech projects' success and value as these projects are totally different from traditional projects and companies. As a result, it is hard for investors in emerging countries to choose projects with potential. It is therefore necessary for such big market players as governments, banks and other financial institutes, large business, experienced practitioners and even academia, to support fintech entrepreneurs.

FUTURE RESEARCH DIRECTIONS

As this Chapter is one of the first attempts in the academic sphere to present an overview of the fintech and its (disruptive) role in financial markets and, in particular, in financial inclusion, there is still room for future research on the topic.

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First, the analysis may be deepened by introducing additional case studies of fintech projects aimed at inclusivity gaps mentioned above. This will allow for generalizations and representativeness, which are essential for the development of well-substantiated theories on the issue. Alternatively, in order to get more quantitative data on the role of fintech projects in financial inclusion and financial market as a whole, a survey might be conducted, which opens up a possibility for statistical and econometric analysis. Secondly, as some comparable countries were mentioned in current research, the analysis could go wider and study the situation in other countries and regions, with a focus on their peculiarities and similarities in terms of fintech disruptive and inclusive roles.

An additional direction of further research could be to go deeper in studies of consumer behavior and analyze how consumers combine services of different types of financial organizations or choose between them. For example, to get more qualitative data, financial diaries as a survey instrument may be applied in each particular country or region. Financial diaries have already been introduced in South Africa, India and the U.S. (Collins, 2008; Kamath, Mukherji & Ramanathan, 2010; Hannagan & Morduch, 2015). As a result of such research, both market players and national and international regulators get information on the ways of effective introduction of financial products and services in response to the existing challenges of financial inclusion at acceptable levels of risks and costs.

CONCLUSION

As was shown, financial inclusion is increasingly seen in the world as an important driver of socioeconomic development. In the advanced economies meeting the challenges of inclusion is viewed as an important contribution to the creation of a just society of equal opportunities. In the context of developing markets, financial inclusion is also a powerful lever of economic growth that allows many of the existing informal financial practices to be institutionalized and thus made more effective.

Until recently it was widely believed that financial inclusion challenges should be solved primarily through the affirmative actions of governments, including the policies of the national financial regulators: establishing the rules and incentives for licensed banks and other traditional financial players to work with the “excluded” population. However, modern digital financial technologies make working with the “bottom of the pyramid” consumers effective for private market players. This advancement disrupts the established paradigm and offers an important new class of solutions to the problem.

As this Chapter demonstrates, the private market players are capable of filling any of the existing gaps in financial inclusivity in markets like Russia, with a very complex model of “exclusion”. Though this solution is not universal – the gaps are not fully filled – it deserves the attention of both researchers and policy makers. The proposed analytical approach allows a prioritized set of targeted actions to be outlined for the possible measures, increasing financial inclusion based on cost-benefit analysis. This analysis provides for an effective combination of actions by market players and strong affirmative regulatory actions. Such actions should aim at promoting means of non-direct market participation - regulatory environment and targeted operational stimuli to the private and public market players.

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KEY TERMS AND DEFINITIONS

Crowdfunding: Collection of money from a large group for a business or a cause.

Electronic Money: Electronic store of monetary value on a technical device that may be widely used for making payments to entities other than the e-money issuer.

Financial Inclusion: The situation where everyone is provided with a full suite of high-quality financial services and is able to use them, while there exists appropriate infrastructure and ecosystem of financial market, which together enable these services to improve personal and social welfare.

Financial Literacy: The knowledge and understanding of financial concepts (i.e. interest rates, credit and insurance, discounting), ability to use financial services and products, competences in private financial decisions.

Financial Technologies: An innovative technology in the financial industry that changes, breaks, substitutes, supports or evolves parts of/the whole value chain of the traditional players through offering easier and cost-efficient solutions to businesses or consumers.

Inclusive Growth: A phenomenon that advances fair opportunities for economic participants during economic growth with benefits sustained in each sphere of society.

Inclusivity Gap/Exclusivity Pocket: The sector of population not covered by financial services due to particular reasons.

Mobile Banking: An access to financial services through a mobile phone allowing transactions like payments, remittances, etc. to be executed.

Online Banking: An access to financial services through any device connected to the Internet allowing transactions like payments, remittances, etc. to be executed.

ENDNOTES

- ¹ Microeconomically, access to finance influences both individuals and firms. Firstly, the lack of access to financial services may lead to poverty traps and inequality (Beck, Demirg-Kunt & Levine, 2007). Moreover, a growing literature focuses on the positive consequences of access to financial services which are an increase in savings, productive investment growth (Dupas & Robinson, 2013a), consumption stimulation (Dupas & Robinson, 2013b) and female empowerment (Sanyal, 2014). As for the firms, it was shown by empirical research that small businesses gain advantages from access to credit products (Banerjee et al., 2013).
- ² Some research also shows the positive effects of financial inclusion on macroeconomic indicators (Sahay et al., 2015): economic stability, measured by aggregate consumption volatility (Mehrotra & Yetman, 2015), growth (Dabla-Norris et al., 2015), consumption and output (Buera, Kaboski, & Shin, 2012).
- ³ Such economies are often called the “emerging markets”, which is a complex phenomenon. The latter is more than just an amalgam of well-established metrics including GDP per capita or growth rate, it includes the combination of opportunities and risks for trade and investment in those markets. The concept arose in the late 1980s, reflecting the unprecedented scale of business opportunities in the countries around the globe that were opening to international trade (Goetzmann & Jorion, 1999). The main characteristics of such countries were industrialization, with higher level of human capital, substantial technology potential and the ambition to be competitive (Kalinin et al., 2016).
- ⁴ The share of adult respondents who answered positively to the question of using at least one open account in credit organization, survey of 5,000 users.
- ⁵ The share of adult respondents who answered positively to the question of using at least one open account in credit organization, survey of 1,589 respondents.
- ⁶ This and the latter, Axicredit and Yandex.Money cases are based on the results of a case-study conducted by the authors of this Chapter in 2016 as part of Digital Platforms and the Ecosystems of Financial Inclusion. The Russian experience report (Kabakova, Korovkin & Plaksenkov, 2015).

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Section 3

FinTech Security, Information Privacy, and Ethics

Chapter 20

Security and Privacy in FinTech: A Policy Enforcement Framework

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ABSTRACT

Financial technology (FinTech) has dramatically changed the way of banking and financial services. Computer programs and other technology which used to provide and enable financial services is named as FinTech. However, these services face several security and privacy issues while providing financial services to the users. These services and applications must be secured to enhance the acceptance and usability of these services among the users. The main aim of this research is to provide a policy framework to ensure the security and privacy of user information in financial technology, since FinTech applications and services carry quite sensitive data of its users. This policy framework provides a comprehensive set of policies to secure FinTech services. These policies must be implemented in each organization providing FinTech services.

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INTRODUCTION

In past decade, Financial Technology (FinTech) is rapidly proliferating technology, and FinTech is emerged as new technical term that mainly describes the financial technology sectors for various operations relating to enterprises or organization, which mainly provides with the service quality using Information Technology (IT) applications. Usage of multiple technologies in FinTech such as mobile embedded systems, mobile networks, big data, data analytic techniques, cloud computing and mobile cloud computing, have been played a vital role in the development of FinTech, as discussed in (Li, Dai, Ming, & Qiu, 2016).

In financial industry threats are major issues. Financial Service Institutes (FSIs) face threats imposed by daily innovations in information systems. Some of the risks within an anticipated scope are data abuse, malware attacks and networking errors (Morgan, 2015). In cloud computing masked operations enhances the probability of information breaches and the provided security gadgets cannot effectively cope with threats (Traynor, Butler, Bowers, & Reaves, 2017). The threats manners often raise as financial crisis, disorientation, and execution hindrance (Gai, Qiu, Sun, & Zhao, 2016).

By giving flexible service deployment, the cyber risk management have been powered by implementation of cloud computing. For example, many researches (Gai, Qiu, & Elnagdy, 2016; Gai, Qiu, & Sun, 2017) have proved the efficacy of cloud-based cyber risk management system in the financial industry. This approach classifies information releases that can cause potential privacy breach using organized learning methods.

In modern world, cyber security serves financial industry and is important to reduce security risks (Gai, Qiu, & Elnagdy, 2016). Cyber security is a need of modern days for Financial Service Institutes (FSIs) to reduce the risks of cyber-attacks. Financial industry has a critical concern when higher level security of information is needed and Financial Service Institutes (FSIs) is giving network based remedy (Gai, Qiu, & Elnagdy, 2016; Sharma & Panigrahi, 2013).

A number of solutions are required to avoid cyber-attacks. There should be awareness against cyber in general public and to deal with a cyber-risk is a challenging task due to nature of its diversity, cyber risks are divided into three layers tactical, strategical, and operational layers. The protection of information is based on three principals, availability, integrity and confidentiality (Elnagdy, Qiu, & Gai, 2016; Gai, Qiu, & Elnagdy, 2016). This study provides a policy model to mitigate the aforementioned privacy and security issues.

This study provides a brief background on privacy and security issues in FinTech, such as threats, attacks, adversaries, and malicious behaviors. The main of objective of this study is to propose a policy enforcement framework to ensure the security and privacy of applications used in FinTech. In addition, the objective of this study is to make policies to ensure security and privacy of services and applications used in financial service institutes. The proposed framework ought to address the security and privacy issue mainly faced by FinTech applications that includes lack of reliable authentication and access control systems, threats due to the usage of cloud computing in FinTech, users of FinTech are susceptible to privacy threats, information leakage in the usage of FinTech applications, risks involve in FinTech applications and usage of FinTech mobile applications and services, and cyber concerns involve in the usage of FinTech.

BACKGROUND

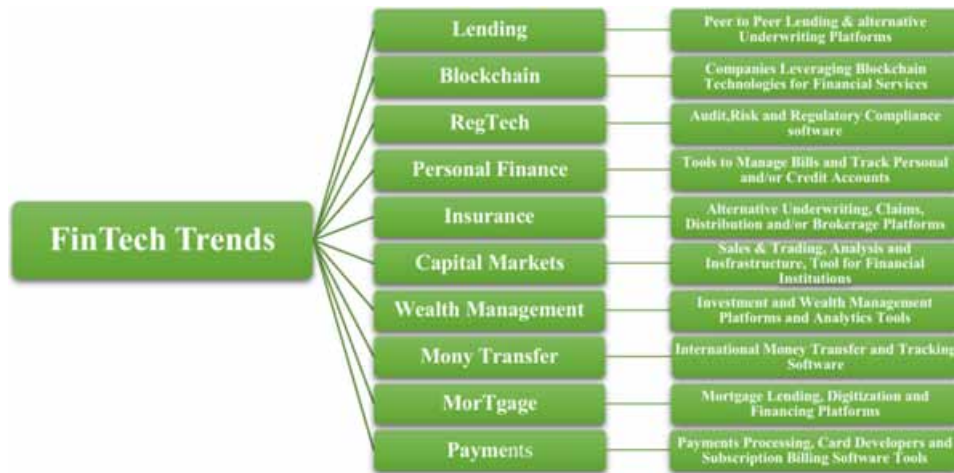
There are many researches who has given their data on the efficacy of preventing specific information from a cyber-risk. Gartner's research (Morgan, 2015) shows the importance of security in financial institutes. Moreover, in another survey by silicon bank only 35% of companies are confident of their information security ("SVB: Cybersecurity report 2015," 2015). There should be awareness regarding security breach of information system by different malwares and anticipated cyber risks (Gai, Qiu, Sun, et al., 2016).

Financial service institutes are frustrated by financial frauds. Glancy et al. (Glancy & Yadav, 2011) developed a model for detecting financial frauds. Many models are made to detect frauds but these models could not ensure maximum detection security because they use quantitative approach. Researchers (Kou, Peng, & Wang, 2014) are working to use clustering algorithms for financial risk analysis. Since there were some serious financial accounting frauds were reported in well reputed organizations such as Enron, Lucent, WorldCom and Satyam, in the course of the most recent decade, the need of detecting, defining and reporting financial frauds is rapidly increasing (Ryu, 2018; Yue, Wu, Wang, Li, & Chu, 2007).

Economically and financially, financial accounting fraud is turning into an undeniably major issue and effectively identifying fraud has constantly been an essential assignment for accounting experts (Ngai, Hu, Wong, Chen, & Sun, 2011; Stewart & Jürjens, 2018). If the internally available auditing system of an organization fails to detect account then the organization has to use other professional procedures and processes to identify financial accounting fraud those procedures together named as forensic accounting. Forensic accounting is the main source to detect those financial frauds which are nearly impossible to detect through internal auditing by applying auditing, accounting and investigative skills (Lim, Kim, Hur, & Park, 2018; Románova, Grima, Spiteri, & Kudinska, 2018; Singleton & Singleton, 2010; Wells, 2007). A review of data mining-based financial fraud and attacks detection research is presented in (Phua, Lee, Smith, & Gayler, 2010), including credit exchange misstate, telecoms membership fraud, automobile insurance fraud, militant detection, financial crime detection, interruption and spam identification. Others scientist have surveyed on frauds relating to insurance (Derrig, 2002) and financial account fraud (Macedo, 2018; Shadrin & Leonov, 2018; Yue et al., 2007).

The security threats to the financial industry have rapidly increased since the introduction of electronic-based financial applications and services in financial industry. Past researches have mostly resolved the conventional security and privacy attacks, for example, malware attacks, network worms, and information abuse (Hu et al., 2011; Qiu et al., 2013). Contemporary financial institutions are racing towards utilizing maximum web-related technologies to provide modern services, better quality services and to facilitate their user with new and digital services. This improvement has been amazingly affecting on the modern development in financial industry and new technologies' utilization [1]-[4] (Gai, Qiu, Jayaraman, & Tao, 2015; Gai, Qiu, Tao, & Zhu, 2016; Qiu, Ming, Wang, Yang, & Xiang, 2014). As an evolving marketing paradigm, data sharing has turned into nan essential approach for finance related firms to strengthen their perspectives. Cloud computing is another most attractive stage for financial industry to communicate, share and exchange their information [5]-[12] (Gai, 2014; Gai & Li, 2012; Gai, Qiu, Zhao, Tao, & Zong, 2016; J. Li et al., 2012; Y. Li, Dai, Ming, & Qiu, 2016; Qiu, Chen, & Liu, 2014; Qiu, Ming, Li, Gai, & Zong, 2015; Qiu et al., 2008).

Figure 1. Taxonomy of FinTech trends



Similar to other new technologies, IT applications relating to FinTech have to face certain challenges despite their exciting benefits. Services and applications related to FinTech are facing the usual Privacy and security issues, such as enforcing confidentiality, integrity, and availability through authentication, access control and authorization. It is quite important to highlight privacy and security issues to improve the adoption of information technology application and services in FinTech (Gai, Qiu, Sun, et al., 2016; Traynor et al., 2017).

A number of financial technology trends exists in finance market, and these FinTech trends provides a number of useful facilities to the users so they can manage their money and business efficiently. FinTech provides different types of services and applications, such as FinTech finance services are provided on demand which is much embraced idea for customers by using mobile and cloud computing. Figure 1 presenting taxonomy on the trends of FinTech which is based on the report presented in (Cb Insights, 2018), this taxonomy is demonstrating the motivation of this research and highlighting the importance of Financial Technology in the modern financial market.

POLICY FRAMEWORK

This policy framework is based on multiple modules that include policies that must be ensured by any organization using FinTech applications or providing FinTech services. A brief description of the modules is as follows; a security module is proposed which is based on a context-aware access control system that access control system deals with the access control in FinTech on the basis of location and time, second module deals with the fraud involved in the usage of financial technology, third module defines policies and protection mechanism related to secure mobile base applications for different threats, and proposes a strong authentication mechanism deals with risks involved in the distribute applications usage in financial technology. The proposed policy framework is shown in Figure 2.

The details of these security modules are in the following sub-sections.

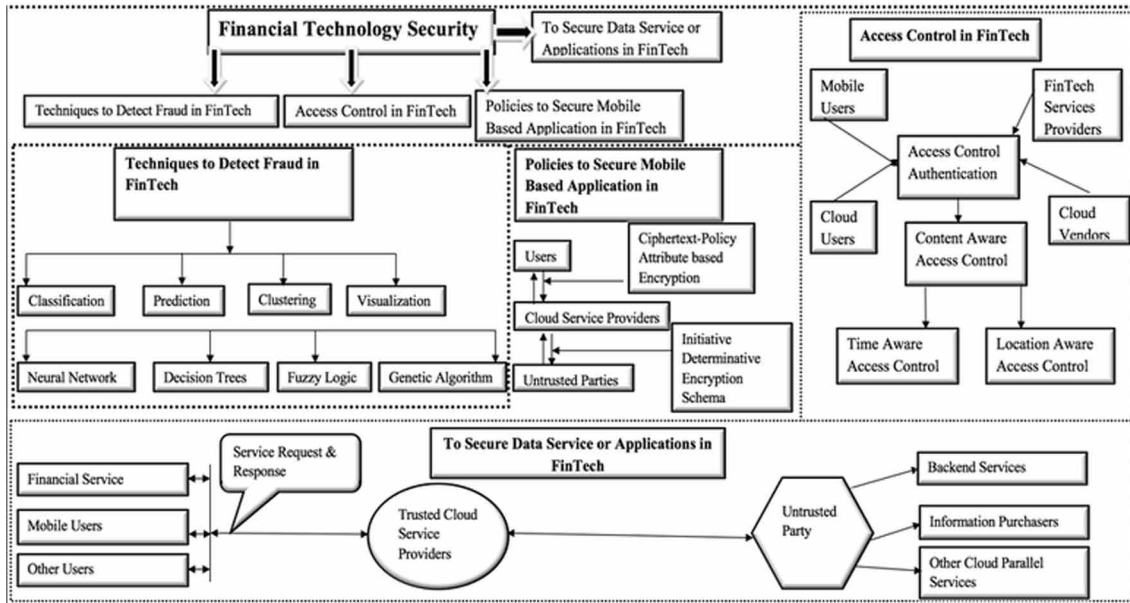
Policies to Detect Fraud in FinTech

This section proposes a conceptual framework from the available literature which is based on the usage of data mining methods and applications to detect financial accounting fraud (Ahmed, 2004; Mitra, Pal, & Mitra, 2002; Sharma & Panigrahi, 2013). The conceptual framework is rely on literature-based knowledge on data mining research (Ahmed, 2004; Mitra et al., 2002; Sharma & Panigrahi, 2013), fraud detection research (Bolton & Hand, 2002; Derrig, 2002; Phua, Lee, Smith, & Gayler, 2010; Sharma & Panigrahi, 2013; Yue, Wu, Wang, Li, & Chu, 2007; Zhang & Zhou, 2004), this framework is shown in phase-I of Figure 2.

A financial fraud framework is proposed in (Ngai, Hu, Wong, Chen, & Sun, 2011) which is based on a framework of financial crime of the United States Federal Bureau of Investigation, and it is one of the reputable frameworks or schema to detect financial fraud. Phase I of the Figure 2 contains two layers, the first layer consist of four different data mining applications classes of classification, prediction, clustering and visualization (Bolton & Hand, 2002; Derrig, 2002; Fawcett & Provost, 1997; Phua et al., 2010; Sánchez, Vila, Cerda, & Serrano, 2009), a set of algorithmic approaches support these data mining application classes to obtain the related relationships in the data (Turban, Sharda, & Delen, 2010). The policy framework for services and applications of FinTech is shown in Figure 2.

1. **Data Mining Techniques toward FinTech Fraud Detection:** A brief description of the policy framework relating to fraud detection, the four application classes of data mining (i.e., classification, prediction, clustering and visualization), and each component of this framework is elaborated in further detail in the subsequent sections
 - a. **Classification:** FinTech services or applications are secured through classification in which training a data set model and target set are used to predict categorical labels of unknown objects and the categorical labels are predefined and discrete. Some important techniques which are used for classification includes Neural Network, Naive Bayes and Support Vector Machines (Zhang & Zhou, 2004). Different FinTech services are secured by classifications which are credit card fraud, corporate fraud and other types of fraud. Classification is more powerful technique which is proposed to secure FinTech services and application in case of fraud detection.
 - b. **Clustering:** Clustering protects the security of FinTech services and applications by partition of object in to similar and dissimilar groups and clustering also known as data segmentation. The data point of a cluster is similar and should be dissimilar from other cluster. K-nearest neighbour and Naive Bayes are important techniques of clustering. Fraud detection in FinTech must be protected through clustering. Clustering appears to be a far better solution to secure FinTech services and applications against emerging threats of financial technology sector.
 - c. **Prediction:** The FinTech applications have several security threats which are harmful for FinTech services and these attacks are based on some factors prediction estimates numeric and ordered value on the basis of patterns of data set which assure the threats for Financial Technology. The prediction techniques can be used to secure the FinTech service and applications are Neural Networks and Logistic model. These techniques must be used by financial services provider to secure sensitive information of the users.

Figure 2. Policy framework to ensure the security and privacy in FinTech



- d. **Visualization:** In FinTech services the visualization provides the presentation of data which are more complicated and not understandable in simpler form and facilitates users to view quite complex patterns in data mining process. The data which are related to FinTech security sometime it is rather complex, in that case, visualization is suitable way to deliver complex data and patterns into clear presentation of functions or data, so user and services providers can easily understand and can protect their data from adversaries.
- e. **Neural Networks:** The FinTech services and applications must use the Neural Networks base model to ensure the security of applications and services provided by Financial institute of services because neural networks are non-linear statistical data models work like a human brain. Neural Network is mostly applied in classification and clustering due to its adaptive and robust models. In FinTech services, Neural Network can be applied for credit card and corporate fraud detection. Financial institute of services can use neural network as a financial fraud detection tool and can be applied on financial data. To predict event of corporate fraud neural network plays an important role. Fraud is a significant issue in FinTech services which can be secured through neural network.
- f. **Decision Trees:** Another tool that can be used to secure FinTech services and applications is Decision tree. Decision trees are applicable to ensure the security threats in FinTech applications and services and this is a decision support tool where node represent test attribute and branch represent its possible consequences. ID3, CART and C4.5 algorithms can be used for planting decision trees. In this policy framework, FinTech decision tree proposed for credit card and corporate fraud detection. CART algorithm identifies and predicts financial statements related fraudulent in Fin Tech.

- g. **Genetic Algorithm:** The security of FinTech services and application is most important phenomenon, and Genetic algorithm is quite substantial technique which must be utilized to ensure the security of services of FinTech. Genetic algorithm is a classifier which auditor decision in a fraud. FinTech services face many security problems among of these credit cards related fraud is being solved by genetic algorithm along with support vector machines (SVM) (Welch, Reeves, & Welch, 1998). Genetic algorithm is best technique to protect the FinTech services and applications against various security threats.
 - h. **Fuzzy Logic:** The services and applications providing by Financial Institute of Services is vital and changes the way of working of financial institutions. Fuzzy logic is a best technique to ensure the security and privacy of FinTech services because it is a mathematical technique that classifies and assigns data to a group or cluster on the base of degree of possibility. Fuzzy logic increases the performance of data due to its numerical representation and enhances the range of operations on data. In FinTech a fuzzy logic model proposed in (Lenard & Alam, 2004) can be applied to detect fraud in an Excel spreadsheets. Fuzzy logic detects fraud in non-financial and financial data. Fuzzy logic expert system is designed to identify the elements which are involved in fraud and FinTech security. Fraud in FinTech services can also be detected though fuzzy logic system discussed in (Deshmukh, Romine, & Siegel, 1997; Pathak, Vidyarthi, & Summers, 2005). The expert fuzzy systems play an important role to detect the privacy and security threats in FinTech services and Applications.
2. **Fine-Grained Context-Aware Access Control Model in FinTech:** This section presents the fine-grained context-aware access control policies of this framework. According to (Conti, Nguyen, & Crispo, 2011; Hussain, Al-Haiqi, et al., 2018; Hussain, Zaidan, et al., 2018), the following aspects can be considered as context: status or condition of few variables (i.e., physical location, temperature, time, light, noise), or an existence of other devices and sensors. In this policies model, security and privacy rules depend on the context (i.e., location and time), and the idea is based on context-aware access control systems (Conti et al., 2011; Hussain, Al-Haiqi, et al., 2018; Hussain, Zaidan, et al., 2018). This research considers only geographical location and time for context-aware access control in FinTech applications and services.

The context-based access control model illustrated in Figure 2 is exclusively responsible to detect, report and thenceforth updating the context condition of the user's device and its related applications in financial technology. Mainly, these types of policies are entirely relied on the theory of context-based (aware) access control system. The context-based policy system acquires the geographical location parameters (Cell ID, Wi-Fi, GPS parameters) via different sensors, devices and forward collected parameters to the central context-aware system upon request. This type of context checks allows the framework to enable the user of enforcing run-time constraints and restrictions on the use of sensitive services and applications in Fintech based on multiple contexts such as time and location. The users have the facility to define constraints and restrictions on the basis of their requirements. The policies and rules relating to context-based access control system are described in following sub sections.

3. **Policy Conditions for Context-Aware Access Control in FinTech:** Access control context-aware policies are imposed on the following basis, different contexts, context conditions and policies; these are elaborated in the subsequent sections.

Security and Privacy in FinTech

- a. **Context Conditions:** In this policy framework, geographical location of the user and the time period are considered as context, in other words these are the factors being used to secure Fintech applications and services on basis of time and location. The user device physical location data is collected via GPS and user can allocate names of the location where the user device is placed. A policy time period presented in policy framework is a particular time interval within which a policy must be imposed. The following format is used to represent the date and time for context policies;

DD – MM – YYYY – hh: mm: ss

Additionally, this framework considered to use the *R* flag to specify periodic or repeated events. The value of flag *R* is taken out of the

Set [*OO, ED, WK, MT, AN*]

This is specifying the frequency of an event:

OO → Only Once, *ED* → Every Day, *WK* → Weekly, *MT* → Monthly, and *AN* → Annually

Time and date both describe the policy time period and on basis of the value of *R* an event is recurred (i.e., the frequency is defined by the value of *R* with which that specific policy context-condition must be verified). For instance, to set a particular event which occurs every Monday from 9:30 AM to 5:30 PM for eight months *R* would be set to *W* and the time period would be set as an event of date-time, for example, beginning at 15-02-2018-09:30:00 and finishing on 15-10-2016-17:30:00.

- b. **Definition 1 - Context-Aware Condition:** The geographical location and time are considered as context in this policy framework, and the *c* is the notation to represent context. A policy-context is a check or condition to impose associated restrictions. A context-aware policy can be defined as the combination of context-condition and restrictions associated to this context. A single particular context could be linked with only a policy restriction and only single policy restriction could be linked with only a context (i.e., one-to-one relation).

Suppose *L* represents the name of a location and demonstrating the specific location and suppose [*f, S, E*] respectively are the frequency, start time, and end time, which specify once a particular context-policy would be imposed. So, the conditions for the context-policies are specified as a tuple of [*L, (f, S, E)*].

- c. **Definition 2 – Active Context Condition (Active Policy) for FinTech Services:** A particular context condition *c* is named as active context condition at a specified time *t*, if all the compulsory restrictions which a context describes are confirmed. An active policy *P* which is linked to the active context condition *C* is named as the active policy. There is the possibility that multiple contexts can be active at the same time.
4. **Policies to Secure Distributed and Mobile Based Applications/Services in FinTech:** Figure 2 shows the procedure of suggested conceptual framework in operating a mobile transaction and other services which is based on (Gai, Qiu, Thuraisingham, & Tao, 2015), and it defines the pro-

cedure of transaction using P2DS (Architecture of Proactive Dynamic Secure Data Schema), and the details of P2DS model can be found in (Gai et al., 2015). To control their financial operations the anonymous and distrustful services providers also required a particular level of authorization and authentication. Thus, merely blocking the distrustful parties is not an adequate effort. The aim or objective of the suggested scheme it assists multiple service supporters without disclosing or revealing the sensitive data or information.

The suggested framework encrypts and secures the part of the clients' information, and it provides the information to the unknown parties only in case it is highly essential to deliver or provide the particular information or services. The information will be forbidden to and kept hidden from all other services, parties and usages which do not have one-to-one or direct relationship with transaction services. The key elements of the services or applications relating to the user's privacy data such as their real name, address or phone number, would be encrypted and converted by this framework in non-human understandable formats.

Figure 2 also shows the policy model required for financial service institutes and their clients. There is always risk of breach in sensitive information, the procedure or framework is made in such a way that even involvement of third party to ensure delivery services cannot keep financial organizations unaware of all issues. The P2DS model proposed in (Gai et al., 2015) ensures that only authorized people should have access to data. It uses three algorithms, first the Static Decryption Attribute Algorithm (SDAA) is designed to assign authority and to scrutinize the status of trusted party. Next one Corresponded Decryption Attribute Algorithm (CDAA) is to assign decryption attributes with decryption authorizations and in last Proactive Determinative Encryption Algorithm (PDEA) is proposed to determine whether the attributes need to be encrypted.

By applying this model and its policies, the following two security goals can be achieved; first, which protects users' related information while using cloud computing and other distributed services. Second, this model concentrates on the privacy and security requirements of the FinTech industry which can protect sensitive information from different security risks.

This section provided a mechanism that can be used to secure sensitive information of financial clients who perform online transactions using mobile applications running on mobile devices, for example, tablets or smart phones. The motivation of using our proposed model is to secure the implemented services accessing by multiple organizations.

FUTURE RESEARCH DIRECTIONS

The implementation of the proposed policies of FinTech is a future objective of this research; there are four different phases of this policy framework. In future, time-aware and location-aware security framework will be implementing, and further it is planned to explore further policies that might help to ensure security and privacy of FinTech applications and services users. Furthermore, it would be a big challenge to consider other factors in fine-grained context-aware access control environment such as, the existence of other devices and sensors, and make policies to protect the FinTech services related to it.

CONCLUSION

This research proposed a policy framework that provides various policies for different security issues of FinTech; this framework covers three different aspects of FinTech services and provides security policies to secure FinTech services. A proper guidelines and policies are proposed in this framework to detect fraud in FinTech. A fine-grained context-aware access control model has also been proposed in this research which controls the access according to the contexts. A solution to protect mobile and distributed applications and services is also provided in this study. This framework will increase the acceptance of technology in financial sectors and will remove the barriers between the financial service providers and information technology. Furthermore, this framework will develop the trust of the users of FinTech on financial services so users can reliably use the services and facilities of FinTech.

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Chapter 21

E–Banking Security: Threats, Challenges, Solutions, and Trends

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ABSTRACT

The online banking industry has overgrown in recent years and will continue to grow as economic organizations remain to encourage customers to handle online banking transactions such as money transfers, access to account information, or payment of monthly bills. During this period, internet criminals and fraudsters attempting to steal personal customer information hijacked online banking. This article proposes reviewing the ways by which fraudulent activities are performed and what banks are doing to prevent such activities, as well as the new security measures that banks are using to increase customer confidence. Therefore, the authors present the threats, challenges to address such threats, some trends, and future landscapes regarding online banking security.

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INTRODUCTION

There are several types of banks, such as public, private, corporate, development, investment, among other functions, but all have as an essential prerogative the provision of services related to individuals, companies, industries and government money. They range from lending and financing of real estate and vehicles to significant trade-maintaining transactions in the country.

Based on this importance of the banks, security must be applied in the day-to-day of these institutions, because the virtual world is a dangerous place, and without some security control, the tendency is for there to be attempts to steal local money, at the time of looting, among other situations of danger and threats.

Online banking, electronic banking or e-banking consists of the user achieving the most diverse banking operations that are not made within the physical banking agencies. Generally, such transactions are carried out via the Internet, ranging from bank totem to mobile devices.

It has changed people's behavior over the way they spend money since financial transactions can be carried out with just one click. At first glance, this ease and practicality lure the consumers in the sense that their money is safe in and by the financial institution. However, most banking threats are transparent to customers (Singh et al., 2006). It is difficult to quantify the damage of a cyber attack to any financial institution since the impact is not only economic, but other elements make measurement difficult, such as damage to the image and reputation of organizations, loss of confidence in the institution and the loss of potential customers. Therefore, the cost of a cyber attack for an institution may represent a considerably more significant amount than the amount extracted by the attackers.

Although e-banking has been a reality for several years, it is only after 2004 that the incidents began to be reported (Kolodinsky et al., 2004). As a result, e-banking use has declined since threats are reported, but in recent years it has gained strength due to other factors, such as new cryptographic algorithms.

None of this is useful when it is the consumer who agrees to be stolen, and this is what most viruses do. Fraudsters take advantage of the innocence of consumers and their inexperience in information security. At the same speed as security techniques advance, threats about such techniques are created (Carminati et al., 2018).

The damage caused by the frauds reaches values in the order of millions of dollars worldwide every year. All these frauds cause customers embarrassment and a lengthy process of adaptation and high costs for the affected banks (Al-Furiah and Al-Braheem, 2009). This chapter, therefore, presents a landscape on all issues ranging from the threat, the challenges to addressing a viable solution to such a threat, and future security perspectives that can prevent new threats from arising that cannot affect online banking transactions.

This chapter presents the following contributions:

- A new taxonomy for classifying threats to e-banking environments.
- A list of new threats that will be organized within the new taxonomy.
- A discussion of such threats and the challenges to address a solution to these threats.
- A review of some trends on e-banking security mechanisms.

From the above, one can note that scams in e-banking environments are not exhaustive, as with each new day a new threat arises. Proposals such as that in this chapter update state-of-the-art concerning new risks and new mechanisms for protecting banking transactions.

E-Banking Security

This chapter proposes a new e-banking fraud taxonomy, and it presents several types of frauds classified inside such new taxonomy. After, this chapter discusses the advantages and disadvantages offered by the many types of e-banking security proposals. Afterward, we will summarize the work, making it possible to view challenges, trends and future perspectives.

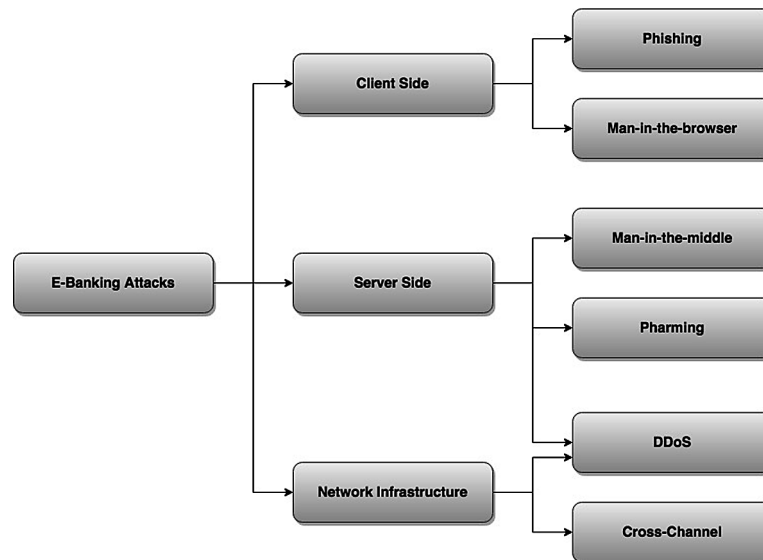
E-Banking Fraud Taxonomy

This chapter proposes a novel taxonomy on security in banking systems, divided into two parts: the first part consists of an approach that organizes and classifies cyber attacks on banking environments, and a second part is an approach that organizes and categorizes current methods of security against cyber attacks discussed in the first part of the taxonomy.

The evolution of computing and new technologies has changed the way data manipulation and information have undergone various changes. As for money, online banking has emerged to make life easier for people, bringing added convenience and agility to the day-to-day operations of our daily activities. Checking balances, transferring amounts and making purchases over the internet is a reality today, but many people still have a bit of a fear of doing this.

Figure 1 shows target-based cyber attacks. Therefore, the attack can be directed to the client and its devices and applications, to the server that supports the banking service and receives client requests, or attacks on the communication between client and server. Threats directed at client devices or applications are mostly idealized through viruses or their variations and require some form of client acceptance (implicit or explicit). Threats to servers or infrastructure that supports banking services are less frequent but usually, occur through cloned services. Threats over the communication infrastructure between clients and the server usually occur through redirecting the network flow to fake sites.

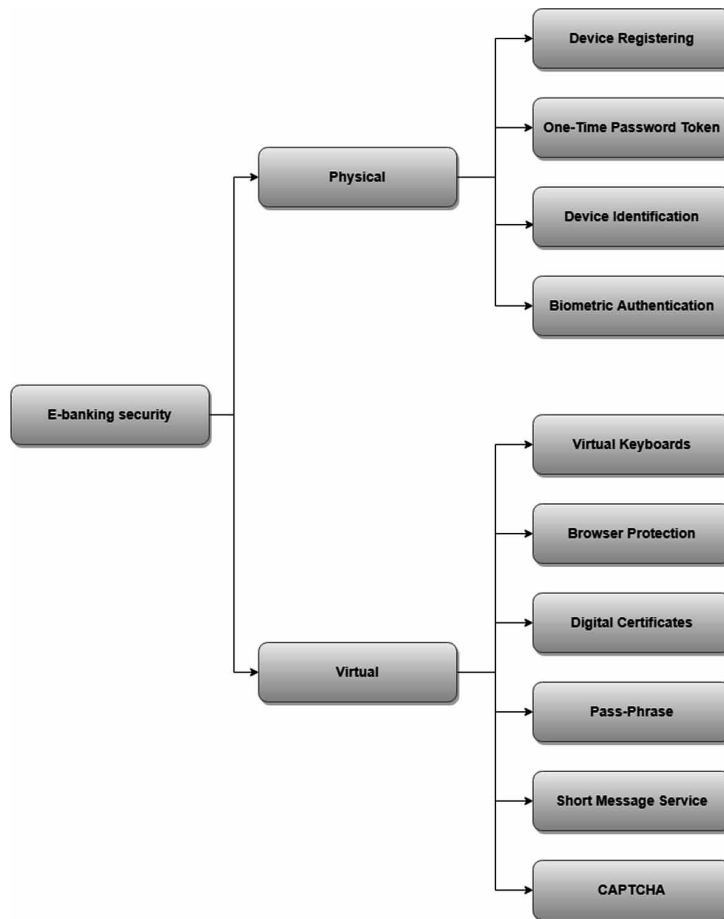
Figure 1. Taxonomy of e-banking attacks, divided by attack target



Based on the increase in the reporting of scams and losses, the fear becomes even more significant, causing many to isolate themselves from this technology and its facilities. However, with some simple procedures, we can make these operations more reliable.

Figure 2 presents proposed solutions to avoid most attacks fanned in the first part of this taxonomy. Such protections can be divided into physical mechanisms and devices or virtual systems and environments. Banking security by physical means has increased in recent years, as it attempts to individualize access, based on devices that are only in property of the client or based on biomarkers. Virtual security consists of digital systems that create abstraction or security mechanisms over which the client can send their data securely.

Figure 2. Taxonomy of bank security mechanisms divided into physical and virtual



However, while banks are committed and invested in protecting their virtual boundaries against known and unknown threats, preserving the full breadth of existing IT infrastructure is not an easy task. The large, dynamic threat environment, coupled with the challenge of improving customer safety habits, gives the fraudsters even more vulnerabilities to attack.

E-Banking Security

The scenario in which the most diverse financial institutions are inserted is also characterized by the need for well planned, integrated, fast, functional and, above all, secure insurance networks. As you can imagine, managing the network of a large corporation, especially in the financial sector, is a complex task. Based on the above, in this chapter, we will describe and classify the different attacks, security challenges, and trends according to the proposed taxonomy.

E-Banking Threats

ISO/IEC 27002 (ISO/IEC 27003, 2013) defines information security threat as being an agent that may cause an incident in a computer system, likely to result in harm to an organization or individual. Threats can compromise systems by exploiting one or more vulnerabilities, whether technological or social vulnerabilities.

A threat can result in a security attack or incident and occurs as a result of a threat that exploits one or more vulnerabilities. The attack is the absolute fact caused, generating, in most cases, financial or image damages.

In e-banking, threats can mean financial impacts on individuals and banking organizations, as well as reputation impairment. We outline the critical threat methods and tools that put e-banking services at risk.

Phishing. It is a type of attack that aims to steal electronic credentials or financial information from an individual. Usually employs the use of false pages or links, combined with social engineering. The main methods used are fake e-commerce or e-banking pages, fake links shared on social networks, e-mail messages containing links to malicious code pages or electronic forms that solicit personal or financial data. Regardless of the method used, the attackers try to induce the user to click on malicious links using social or economic appeal messages (Montazer and Yarmohammadi, 2013). Phishing attacks are often used to steal information from online payment systems or e-banking access information. For example, the user may receive an alleged message from his bank requesting an update on his/her registration, under penalty of cancellation of his account and a link of a false electronic form is informed. By completing your information on this form, the data is sent to a malicious third party (Hewamadduna, 2017). Different types of attacks and techniques perform phishing, such as:

- **Malware:** They are programs specifically designed to perform harmful actions and malicious activities on a computer. When installed on your computer, malicious code will have access to sensitive data stored on the device and may perform operations on behalf of users. The main types of malware are Botnets, Keylogger, Screenlogger and Trojan-Banker (Méndez-García et al., 2014). The use of malware to capture user banking information is the most widespread type of attack due to the diversity of malicious code and the full range and potential of device infection.
- **Keylogger:** It is a type of malware capable of capturing and storing user-entered keys on a computer keyboard. Its activation, in many cases, is conditioned to a prior action of the user, such as access to a specific e-commerce site or Internet Banking (Wazid et al., 2013) (Sbai et al., 2018).
- **Screenlogger:** Similar to the keylogger, able to store the position of the cursor and the screen displayed on the monitor, at times when the mouse is clicked, or the region that surrounds the place where the mouse is clicked. It is a method widely used by attackers to capture keys typed by users on virtual keyboards, mainly available on Internet Banking sites (Sbai et al., 2018).

- **Trojan Banker:** Collects user's bank details by installing spyware programs that are activated when Internet Banking sites are accessed. They are often disguised as authentic software, but when run monitor and capture user data.
- **Sniffing:** It is a technique that consists of inspecting the data transmitted in computer networks, through the use of specific programs called sniffers. This technique can be used by attackers to capture sensitive information such as passwords, credit card numbers, and the contents of confidential files that are traveling through insecure or weakly encrypted connections (Muhammad et al., 2016).
- **Social Engineering:** One of the primary methods for obtaining confidential information from users. The fraudster uses social engineering to deceive and persuade potential victims to provide sensitive information or to take action, such as executing malicious code or accessing fake pages. In the context of e-banking, it is combined with the Phishing technique to steal logins, passwords or credit card numbers (Suleimanov et al., 2018).

Man-in-the-Browser (MITB): It is a type of attack similar to MITM, but in this case, a Trojan is used to intercept and manipulate calls between the web browser and security libraries, such as encrypted connections. It is a type of attack challenging to be perceived by ordinary users since it can handle e-banking transactions even when security factors are in use (Alghazo and Latif, 2017).

Man-in-the-Middle (MITM): Attack technique that is based on exploiting existing vulnerabilities in communication between two points. Its focus is on intercepting the traffic resulting from the communication of these two, acting as an intermediary. The intermediate can be inserted transparently or through an infected device (Ngalo et al., 2018). The method called sniffer is used to listen to the network, allowing the capture of desired packets. As an example of devices that can be compromised by MITM, we can mention the home wireless routers.

Pharming: Also known as DNS cache poisoning or DNS spoofing, it is a type of MITM attack that compromises the security of name resolvers on the Internet by introducing false information into the DNS server cache, causing the DNS server to return an incorrect IP to a query a web page, diverting traffic to a malicious computer. One of the primary targets of a DNS Spoofing attack is the home routers and DNS servers of local networks (Hussain et al., 2016). Pharming is widely used as a method for phishing attacks. For example, the user attempting to access your e-banking page will be redirected to a fake page that can be used to collect user data, such as access passwords.

DdoS: Distributed Denial of Service is when a set of computers is used in the attack to de-operate a service, computer, or network connected to the Internet. People or institutions that depend on the affected resources are impaired, as they are unable to access or perform the desired operations as financial transactions, for example (Wahab et al., 2017).

Cross-Channel: It is an advanced attack method in which the fraudster steals the credentials and personal information of a user of a service to commit fraud on an associated channel and account. Cybercriminals use advanced attack techniques to exploit vulnerabilities in a channel to steal personal information from other related channels. This type of attack can be combined with social engineering techniques (Khande and Patil, 2014). In general, such type of attack can use botnets. It consists of infected computer networks that can be controlled remotely to attack other computers or systems. An example of how Botnets can compromise a banking system are DDoS attacks, in which a network of infected computers can trigger a mass attack on a server or network infrastructure of a bank (Sood et al., 2016).

E-Banking Security Challenges

As more and more users use electronic banking for bill payment, wire transfers, and e-commerce, malicious users are eyeing that slice of customers that may be exposed to attacks if banks fail to take preventive measures.

In 2017, Brazil already had 940,000 fully digital accounts in the country, and 76% of Brazilians use internet banking services, thus, just as banks have for years invested in safer coffers to maintain except in today's prime security is a factor of advantage over the competition. In addition to scratching the image of the bank, it is inadmissible for a company to lose space for the competition if it does not have consistent security and also pass this image of confidence.

In this chapter, the challenges and defenses that banks have for security have been classified. The classifications are like "Physics", where these are not included in the system of the bank and the "Virtual", that are in the site/own system of the bank. In many cases, banks use more than one security method to increase efficiency and trust in users' access.

Device Registering: Security method in which the bank recognizes and registers the user equipment (Peotta et al., 2011). Usually, this registration happens physically in the agency or the first virtual access to the account. After this, only equipment registered by the bank has access to the account and its transactions.

One-Time Password Token: A token is an electronic device with the ability to generate passwords based on time synchronization (Wayman et al., 2005). The device has a button, where pressed, will display a numeric key, where the user will use as a password. Generally, this method is used as a second instance of security, shortly after the user enters his/her password. Another form of protection similar to One-time Password Token is the One-Time Password Card (Wayman et al., 2005), which consists of a card containing a table with two fields: sequence number (position) and key number. Each card can provide up to 70 sequential numbers. Its operation consists in the bank requesting the key from some random spot, thus confirming the authenticity of the transaction (O'Gorman, 2003).

Device Identification: In this security feature, information about the device, such as operating system, IP range, cookies, etc., is collected to allow access only to legitimate equipment and also to prevent suspicious access, such as from a country other than user resides (Peotta, 2011).

Biometric Authentication: In this example of authentication, stable body characteristics such as digital, iris, face, and palm are used (Wayman et al., 2005). After scans, these data are compared with those already registered in the system and after that, authorizing or not accessing the site or continuing the banking operation. This method is often used together with the user's password (Von Ahn et al., 2003).

Virtual Keyboards: The use of virtual keyboards for entering bank passwords is a method where the user instead enter the information via a keyboard, will use a keyboard on the computer screen and the mouse for this (Rajarajan, 2014). This method arises to prevent keyloggers from capturing the password entered via the keyboard. Generally, the positions of the letters and numbers that appear on the screen for the user are random, thus avoiding the capture of the password by programs that record the location of the user's mouse (Von Ahn, 2003).

Browser Protection: In this method, the bank itself provides software to protect the user's browser (Peotta, 2011). Usually, this installation happens at the first access to the account and is done automatically and making the user's access impossible without this installation being made.

Digital Certificates: In this method, the digital certificate is a document that proves the identity of a user or company, issued by a certifying entity. At the moment the user accesses the bank's website, this certificate is checked, verifying that the site belongs to the bank (Wayman et al., 2005).

Pass-Phrase: This method differs from the already known password and is widely used as a second authentication method. Passwords are used for access to bank accounts and consist of only one word, containing letters, numbers and symbols and a reduced size. Passwords are phrases that, besides including the same letters, numbers, and symbols of the passwords, can also contain spaces and even a larger quantity of characters, making it difficult to break this information. Generally, pass-phrases are used as a second authentication method (Peotta, 2011), only to confirm the transaction.

Short Message Service: This method consists of a notification to the user who owns the bank account (Peotta, 2011). For each transaction, a message is sent to the owner's cell phone informing about the type of transaction and the value. If the recipient does not recognize the transaction, it is possible to block the card by replying to this message. Some banks also use this method for a second confirmation before the transaction takes effect. The user receives a verification code and will have to enter the code received at the moment the system requests.

CAPTCHA: This is a program, where through tests, be these images, texts or simple mathematical equations can differentiate that humans or machines are doing the access to the site (Von Ahn, 2003). The primary purpose is, if the access to the bank is made by malicious software, this software will not be able to respond to the CAPTCHA test, thus evidencing an attack.

E-Banking Security Trends

The need to remain competitive forces banks to offer new services and amenities. Also, the adoption of new technologies can also bring risks to banking activity. Below we describe some of the challenges we consider essential for E-Banking security:

- **Trust:** One of the highest qualities sought in a financial institution is reliability because it is given custody over immense amounts of values (ISO/IEC 27002, 2013). If a bank suffers an attack and can not defend itself, its image before the users can be compromised.
- **The Resistance of Users:** People are resistant to significant changes by nature. Therefore, users can be resistant to major modifications, resulting in insecurity. We can cite as sudden changes the digital banks (Sood et al., 2016).
- **User:** The development of services for e-banking can be done through software engineering techniques, regulations of sector entities or government agencies among others to ensure security. However, the device used by the user and how it is used can compromise all efforts made. The use of malicious or malware-infected software or Keyloggers can capture sensitive information, weakening security efforts. Another technique that can be used is Social Engineering, which is one of the most difficult to prevent. In order to minimize such vulnerabilities, it is essential to educate the user, use overlapping authentication methods and identity verification mechanisms.
- **DDoS:** Annoyance for not being able to perform a transaction can cause damage to a bank's image, affecting user confidence and causing loss. The DDoS attack directly targets the unavailability of services. This can cause a bank to have several of its services severely affected. For this, there is a need for containment plans and mitigation of the attack.

E-Banking Security

Trying to attract customers confidence, new technologies and services are proposed. In the financial sector, it is no different — the need to remain competitive and attractive means that banks increase the number of existing solutions and services. One of these is called fintech - companies or startups aimed at the financial and technological sector, with the aim of creating and exploring old services in a remodeled way or even building new services. Examples of Fintechs are Paypal, Nubank, SoFi, and Vérios. Other areas of interest can be cited:

Mobile: With more and more people using smartphones there is a migration of services to these devices, seeking to take advantage of the characteristics of these devices (Peotta, 2011). The availability of secure applications for access to banking services will be a challenge, as the number of users catches the attention of criminals.

Bank 3.0: Taking advantage of the digital niche, digital banks arise as an alternative to physical banks. The main difference lies in their organizational structure. They have a centralized architecture and no branches, however, due to the medium where they are inserted - digital, cover a large area of coverage. As your challenges arise: 1) Need to be reliable and credible; 2) Offer competitive and safe services since the entire business model is developed on the Internet.

Biometry: Biometric identification comes as an alternative to conventional authentication methods (passwords and codes), because it combines several desirable characteristics for security, being: the user can not forget the low cost, reliability, not vulnerable to some social engineering techniques, the speed of authentication. Today, biometrics multispectral image sensors are enabled for encryption and hardware tampering - which protect not only the integrity of the sensor but also the communication between the client and the sensor. It is a feature highly valued by the market since these sensors are five times more accurate and four times faster in ATMs and multibank, with a significant reduction of errors. In general terms, there is a gain regarding performance and interoperability. For this reason, in addition to the financial system, the new line of biometric authentication has been adopted in health, electoral and governmental systems.

Blockchain: It is a technology organized in a decentralized way for the storage and measurement of records. Security is inherited from the various decentralized nodes with the power to issue and authenticate records. Thus, any record to be stored can be verified and validated, not by one but by several bases. This record should only be included in the database if it is authorized by several databases, thus increasing security. Many Fintechs were founded and are dedicated to the study and improvement of the use of Blockchain as Circle of Goldman Sachs, Quorum division of JP Morgan. The main difficulties of its adoption are interoperability, privacy, and encryption.

Artificial Intelligence: Considered as one of the primary resources to modify the operation of the banks, its area of coverage goes through the manipulation of the user experience, automation of tasks, identification of anomalies. There is also the risk that this technology will be used by criminals to create intelligent and dynamic tools to be used in fraud.

Major bankers are already testing (in partnership with mobile operators) payments via NFC (Near Field Communication) with mobile phones. This approach payment technology has been used for years in countries like Japan and Australia, but it is still new in several countries. Contrary to what many consumers imagine, these electronic payment devices take over the same logical and physical security mechanisms used by traditional credit cards. And more than that, they offer additional layers of security, reducing the chances of cloning or illegal purchases by third parties, even if the customer's smartphone has been stolen.

In this area, it is worth mentioning that one of the most significant cybersecurity challenges for the banking sector in 2018 is not to implement the technology, but rather to convince the trader that these disruptive payment methods are safe. And they are.

Another exciting technology of online payments that promises to reduce the rate of thefts is the virtual card. These cards are generated by internet banking (provisional security codes) for use in a single purchase. After that, if someone has access to the data, it will not be able to complete the transaction, since all the encoding has already lost its validity. These new technologies have been redesigning the concept of cybersecurity in the country.

The greater the interaction, however, the higher the risks, since these advances also reach cybercriminals. A market has emerged not only from displays of malicious code but also from complete malware offerings such as a service, threat kits, and attack service providers. Now, intruders can buy or outsource complex highly evasive multi-step attacks with little investment or almost no experience, which reduces the entry barrier of new hackers into the market.

Therefore, layered security should be the strategy for new implementations, i.e., it is essential to use different controls at different points in the process of each transaction. This approach is vital to enabling banks to become even more cyber-resistant: also if a defense is circumvented, there will be others to ensure the integrity of the entire ecosystem.

Multilayer security not only allows banks to eliminate the idea of security as an impediment but also to leverage security as an element that enhances differentiation and business innovation. In this way, banks can adapt more flexibly to competitive and emerging threats and opportunities.

FUTURE PERSPECTIVES

Banking institutions will face significant challenges regarding security and innovation from now on. Every day, a growing number of processes move to the digital world, which implies a change in mentality, business models and therefore also in security measures. Customers, faced with this move, expect to be positively surprised by the services of their banks. This expectation can be translated into four words: multichannel, fluency, simplicity and innovation. Avoiding lengthy, complex processes that depend on the physical presence of the client in a bank branch can even encourage them to demand new banking services. It can be, for example, an integrated application for mobile phones, tablets, smart watches, and wearable devices. Or, who knows, a multi-channel experience that flows smoothly, keeps the client engaged and encourages more frequent interaction with the institution.

The idea of E-Banking has been consolidated for some time, not only by the advance of the Internet but also becoming present with the help of innovation and the technologies used for information security. The eternal paradox of information security is that with every new technology that comes to generate customer convenience, it also produces some trace of vulnerability that at some point will be used by cybercriminals to invade systems, steal or hijack sensitive data. Talking about the future of financial institutions, makes us think about how we evolve in different ways. While for banks targeting Internet Banking, Mobile Banking and even BitCoin are common, we can also associate this evolutionary leap in encryption, digital signature, data protection, Blockchain, and various other security-related terms.

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Technological developments have pointed to an increasingly digital future, and financial transactions are being incorporated into our routines as something more simplified and transparent. We can see this reality through payments made with mobile and wearable devices. The financial sector has always been one of the most advanced regarding investment in IT and products and services related to financial transactions, and it is no wonder that the emergence of Banks 3.0 comes from technologies such as cloud computing and cybersecurity.

It is noteworthy that this evolution came from a disruption of paradigms, the rise of digital banks represented one of the biggest challenges for the financial market, where it fostered significant changes in the behavior of its consumers. It is possible to see soon that we will have a significant conceptual change regarding financial institutions, in the era of Banks 3.0, they cease to be banks and become financial assistants, all happening online and with little interference from people or institutions regulatory frameworks.

The significant shift from traditional to digital banking has its base formatted in efficiency and confidence through technology and cybersecurity. A digital banking experience, the essence of the Banks 3.0 concept, will be driven by the most automatic, intelligent and secure delivery of products and services. But to consolidate this new concept of bank information security will be fundamental. CEOs who intend to offer this unique experience, in the future so present, besides understanding about the new business models, processes and technologies that will allow us to evolve to the concept of Bank 3.0, should consolidate the idea that without security investments this will not be possible.

Ultimately, Bank 3.0 needs to be agile enough from a technological, structural and cultural standpoint to allow it to adapt to rapidly changing business and technology environments continually. A significant challenge when integrating so much technology and security, identity and compliance requirements. Therefore, the basics that an organization must consider to be increasingly protected are related to processes, staff, and technology. It consists of the application of measures with different approaches, from operational, administrative, technical or technological, to legal and regulatory issues. Only taking all this into account, an institution will have a full possibility to guarantee its security in the face of the many adversities that currently exist in the corporate environment.

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Chapter 22

Ethics in Mobile Banking: A Case Study of Kenya's Mobile Money Platforms

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ABSTRACT

This chapter addresses the ethical issues relating to mobile money transfer in Kenya. The mobile money transfer industry has grown exponentially in Kenya. Both the formal and informal sectors have embraced the use of mobile money transfer as a convenient means of transacting. With a plethora of advantages, most notably financial inclusion of the informal sector, mobile money transfer also has its ethical demerits. Despite the ethical challenges being experienced, the use of regulation coupled with education of users on ethical issues and security of mobile money transactions will assist in reducing unethical conduct.

INTRODUCTION

The invention and embracement of money transfer commonly referred to as mobile banking has enabled consumers who would otherwise be locked out of access to financial services stand in a better position. Mobile Money Transfer (MMT) has pervasively cut across almost all economic sectors in the country paving way for a new way of substituting cash transactions that were seemingly tiresome.

In Africa, and particularly in Kenya, the industry has tremendously grown with numerous companies joining in to share the pie in the market space. Being the newest technological development in recent times, it has bridged a gap that existed and people who were previously unable to access loans through the bank can do so now with ease, at the comfort of their phones. Financial services via the mobile phone is one principal way in which mobile telephony is transforming the life and business in developing countries (Gavin & Jesse, 2009).

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With companies such as Tala, Zenku and Mshwari by Safaricom in Africa, the informal sector is now at a vantage point and they do not need to go through the bureaucracies associated with banks to access mobile cash and loans. Mobile money transfer has become an inordinate tool towards the achievement of Sustainable Development Goal (SDG) eight (United Nations, 2016). However, this might not be realized unless mobile industries integrate and implement the ethical and moral values and virtues in their business operations at this time when we are ‘witnessing the disintegration of ethics or at least failure to apply it in business operations as argued by polo (2008) and (Gomez, 1999). However, the biggest question is ‘what are the Ethical issues surrounding Mobile Money Transfer?’

Boatright (2009), indicates that this being a relatively, there are in-house plans by the regulators to establish a modern incubation laboratory in the region to advance their services in mobile money transfer and other mobile applications. However, the sector has not yet acted on the ‘critical and moral issues’ which if overlooked will contribute to unethical conduct in the industry (Every business has ethical codes and operating methods and industry principles, (Badi & Badi, 2009, p. 27).

Gichure (1997) defines ethics as “the systematic study of the actions of humans from the point of view of their rightfulness and wrongness as a means for the achievement of man’s ultimate happiness. Weiss (2006) on the other hand posited that good business is equated to good ethics. As moral agents, our actions are a true reflection of our society.

Gichure (1997) explains that we are all guided by ethical values such as; accountability, honesty, integrity, reliability, loyalty, respect, truthfulness, diligence, fairness, self-restraint and citizenship. Undeniably, there are soft and hard ethical issues within the MMT industry that needs to be addressed. Legal frameworks applicable to mobile payments maybe insufficiently defined to clearly allocate rights and obligations between consumers and the network operators in the event of operational errors, incidences of theft or fraud or other unforeseen problems (Kenya Bankers Association [KBA] 2013). These issues are security threats from online hackers, fraudsters and money launderers which includes drug dealers and unethical conduct of some of the industry players. These security threats are actively contributing to emergence of ‘economic bandits’ in Kenya as inferred by Fisman and Miguel (2008) and Spinello (1997).

This review therefore outlines the ethical and moral issues witnessed in mobile payment applications specifically the Kenyan environment with an overview of how the ethical issues are affecting the mobile payment applications available. The background will highlight the pertinent issues growing day by day as well as the main ways that Mobile Network Operators (MNO) have adopted to counter them, The author will thereafter address the gaps that are glaring as witnessed by the current regulatory framework where consumer protection issues have not been sufficiently addressed.

BACKGROUND

Mobile Money Transfer refers to the moving of money using mobile phone technology operated by either a mobile phone company or an independent operator (Gichuki, 2013). Cook (2015) explains that the M-PESA mobile money service was launched commercially in March 2007 by Safaricom. Safaricom, currently the leading mobile network company in Kenya embraced the idea and launched a new mobile phone based payment and money transfer service, known as M-Pesa (William, Tavnet & Mit, 2010). The innovation enabled users to have virtual accounts where they could deposit money on their mobile phones send balances using SMS technology to other users (including sellers of goods and services), and to redeem deposits for regular money. Usually, there are certain charges that are accompanied by such

transactions. Subsequently, other mobile phone service providers in Kenya and around the world have since adopted this idea and launched similar services under their respective brands (Gichuki, 2013). For instance, Uganda has MTN and Airtel, while Tanzania has Tigo, Zantel, Vodaco, Zimbabwe Econet is doing well.

Minimum requirements have to be met to allow the users access the service, this includes owning a mobile phone which enables them to register and open accounts with the various providers if they meet the threshold specified. The most enviable aspect about MMT lies in the fact that their services are available round the clock not forgetting about their easy access to everyone even those living in remote regions. The use of mobile payment applications to execute transactions is gaining momentum progressively. Of grave concern is the protection of users as there are ethical and moral concerns largely witnessed that ought to be addressed. Though mobile money transfer is a new technology that has changed the lives of many Kenyans and other East African Countries, it has soft but hard ethical issues which ought to be addressed by the industry. Being 'moral agents' who are directed by 'will and freedom', mobile players need to pursue good motives which the society accepts and respect (Oruka 2007, p. 3).

In Kenya, the Communications Authority of Kenya (CA) formerly referred to as Communications Commission of Kenya (CCK) regulates the mobile network industry. Notably, CA is not at all sufficiently competent nor qualified to regulate the mobile money transfer services sector on its own (Gichuki, 2013). This could be attributed to the fact that Mobile Money Transfer services involve some finance aspect and information and technological aspects that may be beyond its proficiency. As much as MMT has its numerous pros, convenience being the most visible, there are many risks that are associated with its use, emphasis being on the nonexistence of a legal framework to control its actions. Consequently, there are no specific laws in Kenya explicitly regulating the MMT industry business despite the fact that it commands a wide consumer base and greatly impacts the economy in various sectors and ways (Museve, 2014).

Some of the glaring concerns include fraud, stemming from unprecedented and unregulated technology being used by consumers and service providers, unfair competition by new entrants looking forward to gain some market share by offering rates that are deleterious to other players in the market, money laundering, wooing clients by use of unfair means and others shall be explored under this study. It is also essential to determine which party is accountable whenever an error or fault occurs in the course of transactions. Additionally, proper guidelines to be followed when contracting agents for conducting transactions should be laid down clearly. In as much as MMT services have greatly impacted the economy in Kenya, there is a deficiency of laws that specifically seek to regulate the neophyte but transient industry. The present laws are touching on the areas of communication; electronic transactions, finances and banking are scattered but unfortunately do not address specific MMT services issues lurking by. Museve (2014) reveals that when one critically examines these scattered laws, it then dawns that there are many inconstancies and gray areas that need to be examined.

LEGISLATION RELATED TO THE USE OF MOBILE MONEY TRANSFER IN KENYA

The Kenya Communications (Amendment) Act 2009

In the definitions section of the Kenya Communications (Amendment) Act 2009, Mobile Money Transfer Services has not been given a definition. A definition of a computer been provided instead and the

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Act thereby goes on to limit itself to electronic materials in computers as opposed to those in mobile phones, quite operational in MMT. Njaramba (2013) reveals that this is why the MMT services remain unregulated by the Act. A closer examination of some sub-sections under section 83 will reveal that the mobile phones are not explicitly covered as they restrict themselves to computers only. The previous Kenya Communications Act 2 of 1998 that preceded this Act did not even provide for regulation of electronic transactions and neither did it provide for Mobile Money Transfer Services. It is through the amendment of this act that led to the 2009 Kenya Communications (amendment) Act that electronic transactions are provided for.

The Kenya Information and Communications Act, Cap 411

This legislation recognizes electronic transactions by defining the terms electronic mail services, electronic mail services, electronic mail, electronic document interchange and electronic voice mail but it does not have provisions regulating the use of MMT (Mobile Money Transfer) services. The Act also does not define Mobile Money Transfer Services.

The Banking Act Cap 488 of the Laws of Kenya

The Banking Act, Cap 488 of the Laws of Kenya regulates banking business and other connected services. The question that needs to be answered is whether MMT services may fall under “connected services” of banking businesses as envisaged by the Act. This Act falls short of defining mobile money transfer. When Safaricom approached the CBK in early 2007, there were no laws governing a mobile money service like M-Pesa, consequently the CBK issued a “Letter of No Objection,” and M-Pesa was launched the following month. At the end of 2008, with the huge success of M-Pesa and the growing concern of the Kenyan Bankers Association (KBA), the Ministry of Finance asked that the CBK conduct a risk assessment of M-Pesa, which was done and published in the Kenya Gazette in early 2009, confirming that the CBK was satisfied with the risk situation and that they do not consider M-Pesa to be a banking business.

The CBK provides guidance to mobile money under Article 4 of the Banking Act, which covers Payment Systems, rather than banks. As such, it is the National Payment Systems Division (NPSD) of the CBK that provides oversight, not the Banking Supervision Department. As a safeguard, however, CBK exercises full supervisory oversight over the trust accounts for mobile financial services providers, which are held at commercial banks. This effectively sequesters the float and protects it against any eventual financial failure of M-Pesa. This also precludes M-Pesa from earning the interest on the float. Section 2(1) (a) defines banking business as accepting from members of the public of money on deposit repayable on demand or at the expiry of a fixed period or after notice. The act does not provide for a definition of mobile money transfer services.

MMT has adopted a similar process akin to the banking one given that there is the acceptance of deposits by the agents of the service providers, and the transfer of money from one’s mobile account to another account as it happens in banking where there is transfer of funds from one’s account to another. However, despite the similarity, mobile money transfer services cannot be said to fully and completely fall within the ambit of The Banking Act as seen under section 16(5) of the Act which clarifies that such a business should be one that lends money to others from the deposit or one that uses the deposit wholly or partly to finance its activities. This provision operates to exclude mobile money transfer service providers from the scope of The Banking Act.

The Evidence Act, Cap 80

It does not expressly provide for admission of evidence from mobile phones. It only mentions a “computer”. This limits the use of technology. Ideally this should be amended to include electronic gadgets like mobile phones.

The National Information and Communications Technology (ICT) Policy Paper of March 2006

This policy paper does recognize the need for comprehensive policy, legal and regulatory framework on ICT. Further it acknowledges the lack of adequate infrastructure in ICT but does not provide for the solutions. It just states what the government intends to do. In as far as Mobile Transfer Services and Mobile payment services are concerned; this policy does not offer any assistance. These and other laws as shall be examined in detail are the existing laws that are supposed to contain provisions for regulating MMT services but unfortunately they are insufficient to do so and thus a lacuna exists in the regulation of MMT services.

KEY PLAYERS IN MOBILE MONEY ECOSYSTEM

There are several players and stakeholders involved in a mobile money platform who all have different roles to execute. The following players and stakeholders exist in the MMT services in Kenya according to Ojijo (2014),

1. **Mobile Network Operator (MNO):** Responsible in providing appropriate infrastructure as well as ensuring total compliance with the regulations and policies of telecommunications within the country.
2. **Financial Institutions:** They facilitate the exchange of money between parties through their infrastructure. They are also custodians of money.
3. **Regulatory Institutions:** These includes Central Banks (mandated for fiscal and monetary policy formulation and control) and the Telecommunications regulator such as Communication Authority of Kenya whose task is to control the communication infrastructure within a jurisdiction. These two regulate matters involving money laundering, anti-competition practices, data security etc.
4. **Agents:** They facilitate conversion of cash into mobile money and vice versa. They earn a commission in return of services rendered on behalf of MNO.
5. **Merchants and Retailers:** They offer a range of products and services and accept mobile money payments in return. By offering more avenues for users to spend their money, demand for mobile money is increased and the need to handle cash is reduced.
6. **Deposit Taking Business:** They use mobile money as a way to deliver their services i.e. financial institutions, bill users, insurance providers.
7. **Equipment Manufacturers and Platform Providers:** These include a wide array of stakeholders like mobile phone makers, network equipment vendors as well as application providers. These benefit from the increased sale of end-user devices like mobile phones, equipment to handle increased network capacity and fees or subscriptions respectively.

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8. **Mobile Money Users:** These are the subscribers of a MNO who derive benefits of using its services. Users can also be non-subscribers, who send money to subscribers. (Ojijo, 2014).

On the other hand, Ojijo (2014), categorizes mobile money services categorized into three major categories:

1. **M-transfers:** Commonly referred as person to person transfer. Entails transfer of money from user to another which may be local or international.
2. **M-payments:** Which entails buying of goods or services and making payments via mobile money. it can range from paying utility bills, concerts, movie tickets etc.
3. **M-financial:** Services includes linking your bank account with your mobile money in order to transact away from your bank branch.
4. **Hybrid Services:** Involves transactions that use more than one service category.

ETHICAL ISSUES ARISING FROM THE USE OF MOBILE MONEY

Transparency Issue

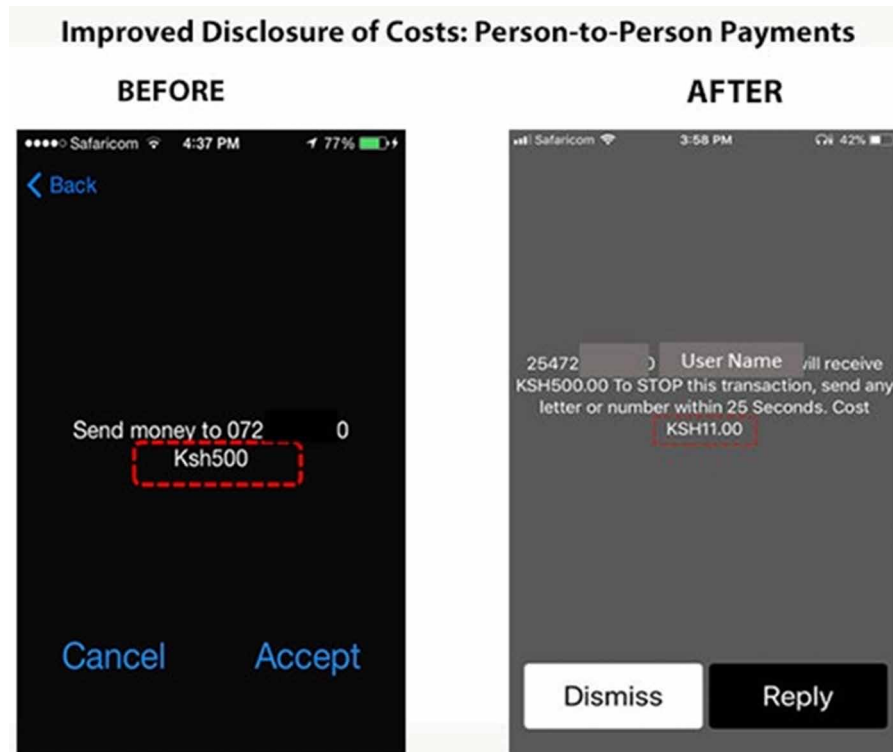
For years, Kenya's digital financial services (DFS) did not disclose to the consumers the amount they were charged for the mobile transactions. Due to the lack of transparency, the Competition Authority of Kenya (CA) in 2016 instructed mobile money providers to reveal the corresponding costs for all transactions undertaken by Clients. As such, disclosure has increased significantly in individual-to-individual payments, payment of bills and use of digital credit (Gubbins & Totolo 2018). The introduction of tariff charts assist consumers to check the transaction charges for each transaction and when the transaction goes through its accompanied by a text message stating clearly the charges incurred. Currently, there's enhanced transparency that was not evident before (Mazer 2018). The diagram below shows before and after scenarios.

The move is not unique to Kenya only but also the rest of Africa where we see various industry players imitating the same for instance in Uganda Ghana, Tanzania and Rwanda. As a result, consumers are now increasingly aware of the charges whether they are sending the money from one person to another or repaying the digital credits available. It is hard to put up a case against pricing disclosure, and it is quite easy to monitor on standardized modes of digital financial services. This makes lack of proper enforcement in several digital financial services markets stand out as a major issue. Rafe (2014) admits that if policies are crafted to ensure protection of consumers keep pace with innovation of products, they would assist in issuing minimum rules and monitoring service providers' transparency/disclosure of key terms as well as prices on the digital financial channels.

Money Laundering Issue

Money laundering is a term often associated with ways in which illicitly acquired money is hidden, reclaimed and then reintroduced into the financial system (Francis 2017). The idea behind this process is to hamper the bid by authorities to trace the movement and earnings of this cash and connect them to the original illicit activity.

Figure 1. Improved Disclosure of Costs ; Person to Person Payments
Source: Mazer, 2018

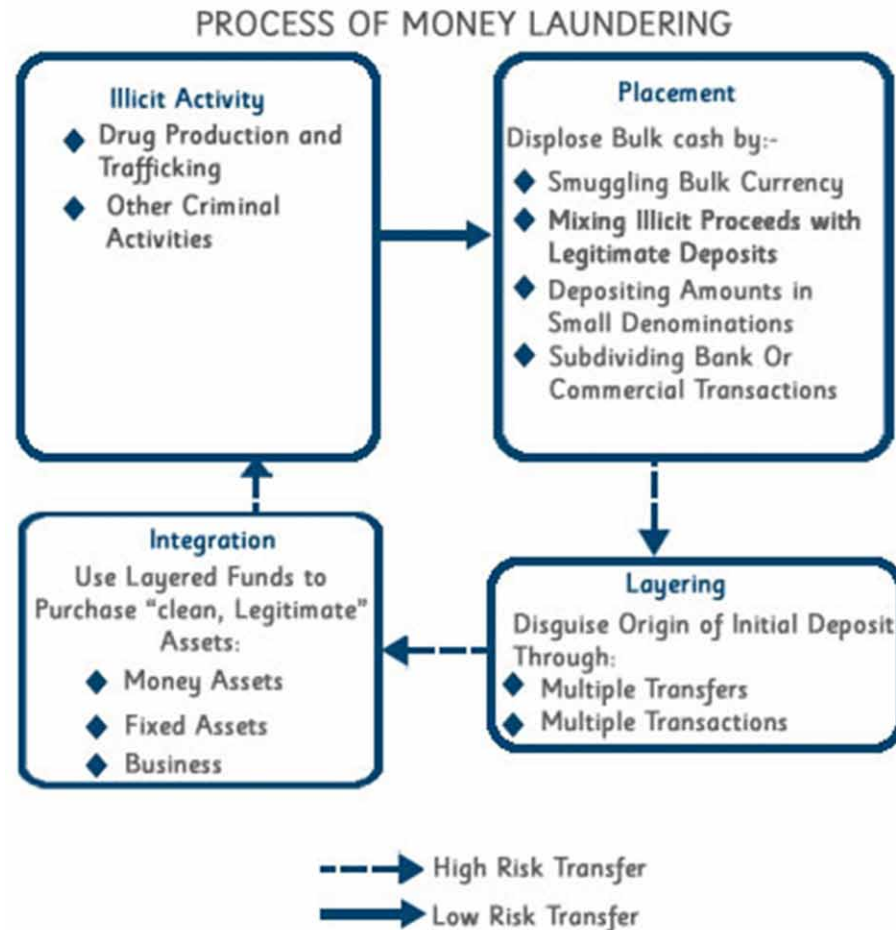


Until recently, Money laundering was frequently associated with financial and banking activities. It has since grown to be associated with mobile money due to the fact that mobile money is used as a way of money transfer and is linked to finance, banking and non-financial telecommunications sector, which is a huge risk that needs to be addressed by the AML regulator (Ojijo, 2014). Subsequently, since the launch of mpesa in March 2007, and the growth of its operations in ten different countries, different operators embrace the business model after seeing its impact within the unbaked and associated businesses. Masinde (2017) observes that Kenya is well known to be a transit point of international drug trafficking and global money laundering activities. As a result, The US state Department firmly points out that mobile money services are therefore susceptible to money laundering activities (Masinde, 2017). Worldwide other players also share in this concern, notably is the fact that mobile payments are commonly operated in countries with weak laws and enforcement of money laundering and financial fraud (Solin & Zerzan, 2010).

Usually, the identification needed from the customers end is very minimal and the entire process dodges the financial reporting system. This makes it futile for the authorities to screen mobile payments even with expertise as Cassara and Jorich (2010) reveal. Cassara and Jorich reveal that there is not much evidence of mobile payments facilitating crime and that is only because no one is monitoring the transactions for criminal activity.

Figure 2.

Source; Singapore Stock Exchange (2019)



Masinde (2017) reveals that other regional remittance channels like Hawala (a type of informal money transfer system popular in Kenya and Somalia) for international funds transfers make it harder to track transactions. Unlike M-Pesa which is closely regulated and has daily transfer limits of \$1,400, the Hawala system allows transfer of large sums of money, is multi-currency and can be used without identification document requirements (Masinde, 2017),

Pestring Issue

Consumers are constantly being pestring repeatedly over the years and little has been done to curb it. According to the Cambridge dictionary, pestring means to behave in an annoying manner towards someone by carrying out an action repeatedly and against the will of the subject. Unknowingly consumers are fleeced off large amounts of cash when these fraudsters claim that a sum of money has been deposited erroneously into their account only for them to come to the realization that they have been swindled. On hindsight, it's usually a fraudulent claim but it comes a little too late for the consumer to

realize it. The fraudsters may then keep pestering for a refund through numerous voice calls. Majority of them realize when it's a little too late. Others go to the extent of duping customers that someone close to them either a family member or friend has an emergency and urgent cash is required to get them out of the situation. It has now been revealed that hardcore criminals are usually the masterminds of these distressing messages and calls.

Unfair Competition by New Entrants

Competition is inevitable in business and new entrants give consumers an option, in mobile money customers consider a variety of aspects when assessing them which include speed, convenience, security, ease of use and charges. Every customer is unique in their needs therefore they all have different preferences in reference to those features. MNO should see it that during the point of entry, they consider at least one or more of these dimensions in way that is grander than their opponents. Adopting all in the new offering in the name of competition is unethical and should not always be the case because what one customer values is different from another. The companies should adopt those features they can enhance and drop the redundant ones. Interestingly, in Kenya, MPESA has managed to consistently outshine the competition by adopting all the five dimensions mentioned by the author. There are three key things that they might consider before venturing into a new market: they must assess all the present options to the prospective service for instance the p2p payments, B2B payments they can provide through mobile money. Additionally, they need to decide whether they will provide a service that thumps the competitors along the five dimensions and lastly they need to be aware of the preferences of their target market (Neil & Yasmina, 2010).

Fraud

Mudiri (n.d) indicates that a consumer using mobile money services is susceptible to incidences of fraud. Technology has always left an electronic trail that is good bait for fraudsters to access information and benefit from such (Sullins, 2019). The movement of money via these mobile apps happens instantaneously and detailed information on the users is usually stored virtually on the networks (Francis, 2017). Cash inflows and outflows between end users and other external entities such as merchants, subscribers, banks or retailers are evident. The typical mobile (easy access anywhere) nature of the product makes it an attractive proposition for the unscrupulous elements in the user base. OECD (2019) report reveals that transactions may have very small values and hence go undetected in traditional Suspicious Activity Reports or High Usage Reports. Given the built-in anonymity and easy access nature of the product, it has become a conduit for terrorism funding and money laundering activities OECD (2019).

Categories of Fraud

Fraud can be categorized into: agent affecting fraud, consumer affecting fraud and fraud affecting the service providers.

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Agent Affecting Fraud

Occasionally, agents in various regions in Kenya encounter fraud in mobile money services. They may include but not limited to; float loss in the agent's account arising from unauthorized use, compromised PINs, and swindles relating impersonation by fraudsters who gain unauthorized access to the agent's float account. Notably, Customers can also commit fraud against agents for example, withdrawal reversal fraud or fake currency deposits (CGAP, 2017). The Helix Institute's 2015 surveys indicate that fraud is a primary concern for many agents.

Consumer Affecting Fraud

Newman and McNall (2005) reveals that the most common type of fraud affecting the consumers is identity theft. Arising from fraudulent/offline SIM swaps that transfer the mobile wallet account from the customer's SIM to the fraudster's SIM, make it easy for the fraudster to intrude into the consumer's mobile wallet and bank account (Talla 2018). It's worth noting that a consumer's mobile number can be linked to almost everything including the subscribers' bank account and as such fraud can easily happen. Fraudsters can acquire a new SIM card issued to them against your registered mobile number (Mazer & Nitin, 2015). With basic information about you beforehand, they can easily access your online transactions, contact mobile operators to get your SIM card blocked then walk into the retailers shop and replace your SIM card using your personal details that were known to them easily accessing your assets. Moreover, employees are also involved in identity theft in the case where they access and ill-use customer's confidential information without consent (Mazer & Nitin, 2015). This has been witnessed as reported in the mainstream media. In Kenya, the extract below illustrates how this happens:

Source: Daily Nation, Kenya

Example 1

Police recently unearthed a racket in Bomet district, where mobile phone subscribers lost cash through a popular money transfer service. According to the police, this seemed like a well-organized syndicate involving Safaricom officials, M-Pesa agents and fraudsters. The police said the man, who was in a prison warder's uniform, had copies of 10 identification cards and SIM cards of subscribers whose lines had been swapped. Two exercise books containing the names of people whose lines had been swapped were also found on the man. It is interesting to note that the man also had PIN details of subscribers whose lines were swapped (Kimutai, 2018).

Other consumer affecting fraud include: subscription fraud where a consumer is mistakenly subscribed to promotions at a fee. Research has revealed that they are usually ghost subscriptions. False promotions are also common where fraudsters impersonate the mobile money providers by letting them know that they won prizes in various promotions but they have to part with some amount in order for them to claim the prize. Fraudsters also go the extra mile of asking for PIN numbers from unsuspecting customers then later defraud them. Often, the fraudsters take advantage of the network downtime, and conduct offline SIM swaps and over the counter transactions that are detected much later when the network has been restored. Agents have not been left behind, sometimes they take advantage of the consumers commonly thought the over the counter transactions by charging the consumers above rates transaction fees or charging them for deposits that are meant to be absolutely free of charge (Mazer & Nitin, 2015).

Privacy issues in relation to customer data is yet another issue. Mobile money transfer companies sometimes find themselves exposed when customer's data falls in the wrong hands and that information is used to commit a crime. This can be achieved through the mobile malware and PC Malware. In mobile malware, malicious software that targets customer operating system on mobile phones, tablets, smart watches or wireless enabled personal digital assistants is used to get hold of customer data. Notable malicious software examples that are commonly used include gunpowder and shedun. Customer data is not always 100% safe in the hands of the employees and many times service providers encounter cases of customer data being exposed to unauthorized people by their own employees. The dark web which is a common platform used for fraudulent activities provides an avenue through which customer data is sold in these platforms. (Chertoff & Simon, 2015).

Example 2: Impersonation of Company Officials

A lady and a gentleman visited an M-PESA outlet, claiming to be Safaricom supervisors. The two wore valid looking M-PESA badges and even carried M-PESA promotional material for the outlet. The two inspected the outlet's log books then left. About 20 minutes later, a man came to the same outlet requesting to withdraw Ksh 35,000. He was allowed to withdraw the desired Ksh 35,000 and proceeded to commence the withdrawal using his mobile phone. The outlet attendants immediately thereafter received an SMS appearing to authenticate and confirm the man's transaction. The SMS received by the attendant had a valid looking M-PESA transaction number and the old man's purported names which were verified against an original national ID which he presented. The M-PESA attendant, convinced about the validity of the transaction, paid out the Ksh 35,000. The M-PESA attendant proceeded to serve the next customer, expecting the amount of float to increase as a result of the withdrawal by Ksh. 35,000. The expected float was not reflected in the valid mpesa SMS after the next customer's transaction. The M-PESA attendant shortly thereafter called Safaricom's M-PESA service line for clarification and the service support person on the other end reported that the transaction withdrawing Ksh. 35,000 was not reflected in the M-PESA system.

Source, Telcom Africa

Fraud Affecting Mobile Money Providers

Fraud within providers is also a concern. Several high profile instances of internal fraud have resulted in significant losses for MFS providers, while putting users' accounts at risk and raising financial integrity concerns for the system. For example, MTN, the largest mobile money provider in Uganda, lost an estimated US\$3.4 million through internal fraud perpetrated by staff in 2011 (Morawczynski 2015), while a similar incident cost Tigo in Rwanda an estimated US\$700,000 in 2014 (Mugisha 2014). Inadequate internal controls (facilitating internal data hacking), inadequate audit processes, poor corporate governance structures, lack of employee fraud education, and lack of whistle blowing mechanisms are among the key contributors to internal fraud

ETHICAL THEORIES

Virtue Ethics

This theory judges a person by the character they portray as opposed to the actions of his behavior. (Fisher & Lovell, 2008), infers that virtues are not the 'ends' rather they are the 'means'. These are personal qualities that present the basis for a person to exhibit a good, noble or happy/fulfilling life, (Debeljuh 2006). Aristotle was the proponent for virtue ethics in our daily ventures and undertakings. He had identified four virtues; wisdom, courage, self-control and justice (Kucukuysal & Beyhan, 2011). Virtue ethics as described by Aristotle has a central notion of improving oneself to be a better individual. If everyone endeavors to do this then the world would become a more productive and moral environment to live in.

The argument is that the rational side of the soul which revolves around intellectual values is the side which should be cared for by the individual. Aristotle states that virtue ethics is deemed to be at variance with the main feature of the current day economic order.' Aristotle felt that 'internal goods' were necessary for production, i.e. these are outstanding to a specific activity which uses 'analytical skills, use of strategic imagination and competitive intensity.' Money, fame and power would thus not come into and as such, they would be labelled as goals that are not virtuous. The virtue ethics creates a basis to understand and exemplify a life of moral character (Hursthouse, 2003). Through practice it posits that we are able to acquire virtues of generosity, wisdom, bravery, self-control and so on. As a result, it breeds an honorable and moral character (De Mol 2009). In other words, virtuous decisions are as a result of a virtuous character. Character is the path through which we can gladly derive meaning of what it means to be a virtuous being. It gives us a perfect guideline for living life without paying attention to explicit guidelines for resolving ethical dilemma.

The Public Choice Theory

This theory posits that "man is a cogent being, acting or eager to act independently, and seeking to gratify his individual best interest. In relation to the study, this would mean that mobile money services have to be targeted or diverse (choice), therefore the mobile money provider would claim worth for money ('more for less') and liability," (Tolofari, 2005).

Accordingly Tolofari (2015), advocates for this notion in public administration terms, criticize the poor public service provision, incompetence and performance as well as surplus of resources and pursue to discourse this with the implementation of business-sector administration processes in the public platform. This study, on the flip side, is grounded on the model of mobile money adoption and the impact it has on people's lives in relation to what they regard as right and wrong practice. As a result, Tsilizani (2016) advocates for representatives of mobile money to see to it that they deliver superior service to the clients in line with the contractual terms binding them with the principal.

The Principal Agent Theory

The principal agent theory originates from the transformation method within the government that is 'intended to create, within the public sector, independent or semi-autonomous organizations in which the enactment function is disjointed from the policy-making function' (Allen, et al 2015). It is the split-up of the supplier and user of public services. Fundamentally, the beneficiaries of public services are

the government and the general public bindind by an agreement. Notably is the contractual affiliation usually created between the principal and the agent. The principal is the party demanding a service or goods, and the representative is the party Providing the service or goods. Tolofari (2015) indicates that this arrangement is that the principal pays the representative and in return he/she is required to have expertise to deliver the service at a value lower than it would cost if the principal were to offer it personally.

In reference to this study, the mobile money provider is the principal and mobile money agents from different MNO are the agents since they are under pledged agreement to supply the mobile money service. Jensen and Maeckling (1976) define the Principal-Agency relationship as prescribed arrangement where the principal engages the agency to execute and deliver services on their behalf by giving the agent autonomy for decision making as they do the tasks agreed .It is a contractual relationship created between the principal and the agent, such that the principal pays the agent and the agent is expected (or is assumed) to have expertise and to be able, hopefully, to make available the service at a charge lower than it would cost if the principal were to provide it individually (Pratt & Zeckahuser, 1991).

It is this arrangement where the agent appears to possess more knowledge than the principal by virtue of the task at hand that places the agent at a more advantaged position which sometimes brings about conflict of interest especially when the agent choses to abuse that authority to pursue his personal interest neglecting the interest of the principal as per contractual agreement. The challenge for the principal is usually to manage the agent in such a way that he adheres to contractual agreement terms (Tsilizani, 2016).

HOW TO CIRCUMVENT ETHICAL ISSUES IN MOBILE MONEY BANKING (COUNTER MEASURES)

General Counter Measures

The following counter measures can be applied:

- All-inclusive fraud management programs, including adoption of screening systems to facilitate early detection and prevention of fraudulent activity.
- ensuring that all MNO comply with the rules and regulations concerning agent recruitment, training, and management programs. This may entirely cope with internal and external risks associated with mobile money banking.
- applying the KYC requirements. Knowing your customer. Embrace Product risk assessments to certify all risks are identified and adequately lessened with appropriate controls
- Adoption of fraud awareness campaigns that offer to sensitize consumers, staff, and agents on fraud trends and prevention measures. For instance use of media campaigns, text messages, emails, that appear as periodic bulletins, working hand in hand with law enforcement agencies, trial and enquires of fraud related cases, safety measures that thwart efforts to compromise PINS
- Educating the consumers on novel fraud types and scams being used in the market. Weight should be given on the means the consumers can safeguard themselves, such as keeping their PINs secure and checking their balances before sending back money allegedly sent to them erroneously.
- Complete agent fraud deterrence measures that include training, compliance monitoring, sensitization programs, and general safeguards limiting the use of the till.

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- Setting up of effective grievances resort channels with qualified staff acquainted in handling fraud and other complaints and devoted alternative channels for agents. Effective resort helps to reassure users of new financial services that their money is protected, and that they will be able to resolve the issue if they encounter a problem (Mazer & Nitin, *Recourse in Digital Financial Services*., 2015)
- Effective staffing practices that include screening of staff before onboarding.
- Inculcation of an obedience culture, coupled with staff training, and enactment of corrective measures.
- Application of strict controls that limit user access privileges and implement double controls.

Apart from dealing fraud within their own networks, MFS providers need to take part in harmonized industry action directed at decreasing fraud. Regardless of the mobile money provider, similar strategies are used across the networks, therefore consumers correspondingly exposed to common susceptibilities. Market level business relations, for example, could monitor trends and encourage the conjoint sharing of information on scam fashions and sensible fraud management best practices. This has functioned well in most African countries where there are sturdy financiers. (Mazer & Nitin, *Recourse in Digital Financial Services*., 2015)

Regulatory Oversight

The lack of suitable regulatory regimes and supervisory oversight can create opportunities for rackets. The absence of permitting by-law can also stifle innovation, making it difficult for the providers to introduce new products without suitable regulatory frameworks. These regulatory gaps are further aggravated by poorly trained employees and incompetent law enforcement agencies who delay the time frame for fraud issues to investigated, prosecuted and resolved. Regulators in these markets should implement applicable regulatory reforms, for instance:

- Enactment of requisite legislation that makes mitigation controls compulsory and ensures application of the same by providers: notably, latest introduction of mobile money and electronic money guidelines in a number of leading mobile money markets, such as East and West Africa and South Asia, has assisted in sanctifying the sector and offering controllers with trappings to implement and direct tougher fraud monitoring and risk mitigation procedures.
- Constant meetings with regulators between consumer interest groups and financial inclusion agencies has seen the rise of support towards achieving statutory reforms, where applicable.
- Cross-border synchronization on fraud mitigation in countries that have several markets with widespread use of mobile money. (CGAP, 2017). Outstandingly, the East African community teamed up to develop a joint SIM card registration structure with a clear purpose of preventing mobile money fraud. (Business Daily, 2015)

Other ways include:

- Introduction of strict rules in relation to using mobile money platforms away from your residence country.

- Introduction of Customer risk analysis and assessments where you analyze the customer in the different transaction stages.
- M-wallet limit controls across providers that states the maximum amounts of transaction one can conduct in a day.
- Cross checking call transaction records for spamming customers.
- Cross checking peer to peer transactions for increase of cash into single accounts.
- Monitoring peer to peer transactions for cash dissemination into multiple accounts

CONCLUSION

Kenya as a developing country has predicaments in ensuring that financial services are accessible to all citizens. However, this can be attributed to the limited infrastructure available, documentation requirements, costs involved in account opening, the proximity between the bank and individuals among other factors. Interestingly, majority of the population who cannot access the financial institutions own a mobile phone or have access to one. The advent of the mobile money banking services has seen the unbanked individuals catered for at a click of a button.

This accessibility has seen the rise of the mobile money banking industry, where even the numerous documents that conventional banking asks for have been eliminated. The advent of the mobile money banking has had numerous merits from easily paying for various utilities such as electricity bills, school fees, and bus fares, paying for goods and services in retail stores to purchase of airtime and provision of banking services. It is with no doubt that it is a good thing and has eased the day to day life in many aspects.

Notably, there are many aspects through which this technology has largely improved the lives of the netizens who use it as a social and economic device where relationships have been enhanced by sending money for the purpose of gifting or contributing to a particular cause (contributions for events), airtime and vouchers to acquaintances and family members. At the same time, the relations and family bonds have drifted apart as a result of this platform. Home visits have become less regular since people working away from home can easily send money, save money, contribute to affiliated groups like chamas at a click of a button.

Secondly, lives have been transformed as a result of mobile banking. Particularly the rural men and women who had little knowledge about banking can now access the much hyped service similar to the urban population. This financial inclusion has in an immense way impacted on the social and family structures of this rural population. Although mobile money transfer has trendemendously grown in the recent past, the question of ethics still lingers on. The aim of this case study was to bring to light the need of incorporating and applying ethics to the letter in the mobile industry since it is susceptible to fraudulent activities, vulnerable to fraud, cybercrime and money laundering. It's just a matter of time and the government will come up with sound policies and guidelines that will see to it that the mobile money transfer services operate smoothly. This needs to be implemented expeditiously.

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Chapter 23

Impact of Mobile Money on Financial Crime, Money Laundering, and Terrorism Financing

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ABSTRACT

Financial crime, money laundering, and terror financing have been perennial menaces that downplay the major headway made in the financial transaction space. Businesses and individuals have found it prudent to always try remaining ahead of the perpetrators behind the vices. The springing into life of the mobile money in the second half of the first decade of this century has revolutionized the manner with which risk management in this respect is handled. In this chapter, the author posits that although mobile money has led to greater financial inclusion, the rate with which the myriad financial crimes have been reported over the past decade in the face of this phenomenon raises the need to stay abreast of developments in this space.

OVERVIEW

Financial crime, money laundering and terror financing have been perennial menaces which have sort to downplay major headways made in the financial transaction space (Solin & Zerzan, 2010). Businesses and individuals have found it prudent to always try remaining ahead of the perpetrators behind the vices. The springing into life of the mobile money in the second half of the first decade of this century has revolutionized the manner with which risk management in this respect is handled. However, though Castri (2013) noted that mobile money has reduced the risk of money laundering, the rate with which the myriad of financial crimes have been reported over the past decade in the face of this phenomenon raises the need to stay abreast of developments in this space.

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Impact of Mobile Money on Financial Crime, Money Laundering, and Terrorism Financing

In the emerging economies such as Ghana, Kenya, Tanzania, Nigeria, India, Uganda, Zambia and Argentina, mobile money has proved to be highly popular. This has been expedited by the huge unbanked population that, with an integral access to mobile gadgets, finds it easier and more convenient to make use of mobile money as an alternative to effecting financial transactions (Akomea-Frimpong et. al., 2018). As such, the traditional banking services provides have been left with a few reserve roles, less robust as they initially used to be. In Kenya, for instance, 44 per cent of the Gross Domestic Product (GDP) was represented by the value of the total mobile money transactions in 2018 (Munda, 2019). That implies that nearly half of the Kenya population is increasingly using the mobile platforms to initiate and complete corporate and retail transactions. In Ghana, with its largest Telco –Mobile Telecommunications Network (MTN) having over a 14 million subscriber base, mobile money can be seen to be the main platform that most of the unbanked in the West Africa nation get to join the formal banking system. As a matter of fact, PwC, 2015 asserts that over 80 per cent of the Ghanaian population has no access to the formal financial services.

Since it was embraced for wide use by commercial players and for person-to-person transfers, mobile money has been applauded for the efficiency it brought of facilitating fast and effective completion of payments between businesses, banks and consumers (Mirfin, 2019). Notably too, it mitigated the risk of carrying hard cash. As Castri (2013) confirms, individuals can now load their money into their mobile money transfer platforms and not feel the fear of being physically stolen from by sneak thieves and muggers. Further, the mobile money has not only expedited local funds transfers for the emerging economies but also international remittance, thanks to established players such as Apple Pay and PayPal joining the bandwagon (Mirfin, 2019). As such, customer experience has become very convenient with the use of mobile money, businesses have realized notable reduction in expenses and reduced paperwork and associated costs with regard to making and receiving payments, tremendously improved cash flows with swift payments, and enhanced the access to actionable data for clients that is stored in the applications (Castri, 2013).

Alongside this robust improvement in payment and money transfers has come one of the most covert yet pernicious manifestations of financial crime in our time. While the traditional criminal ways of fraud could not thrive with the mobile money tool, the criminals have equally adapted new tricks presented by changing technology and communications (Ghanaweb, 2019). GhanaWeb (2019) further observes that with the highly secured modes of mobile money transfers through the internet that has revolutionised business delivery processes, mobile money has created new avenues and opportunities for tech savvy criminals to defraud unsuspecting users. Identity theft, internet fraud and credit detail thefts all of which manifest as cybercrime, have stealthily crept into the mobile money platforms creating a huge risk of financial crime than what has been seen before. Money laundering, especially across countries has found a steady anchorage on this platform, calling for a deeper and a more intrinsically robust level of scrutiny to restrain (Kersop, 2016).

The pervasiveness of financial crimes done through the mobile money has often crippled the efforts put in place to reduce corruption in a number of countries using the payment system. Through illicit business activities such as drug dealing, illegal mining, wildlife crimes and human trafficking, funds have been injected into economies, oftentimes causing unprecedented macroeconomic distortions since the government banking systems are unable to track the points of the inflows into the economy. In countries like Kenya and Ghana where corruption perception index (CPI) is relatively high (Transparency International, 2018), government revenues have been swindled, tax evaded and questionable private businesses been erected all fuelled by the efficient mobile money payment systems that help unscrupulous officials

transact without being caught easily. Individuals have gone further to open multiple accounts on the mobile money platforms, through which money laundering has efficiently been engineered to levels that have virtually almost thrown regulators to the dreadful realm of relenting (Solin & Zerzan, 2010).

In addition, the frequent terrorist attacks in countries like Somalia, Kenya and Uganda have not escaped linkage to mobile money. Terrorism is a heinous plot that is generally planned for months by the perpetrators and would often need huge sums of money to finance it (Mirfin, 2019). As such, since it is not as easy to effect the transfer of funds using the conventional banking systems, the use of mobile money has become a relatively safe channel as most of it is monitored post-the-fact. For instance in an attack done at a business complex in Kenya's capital in February 2019 by terrorists allied to the Somali Al-Shabab militia killing 21 people, the Anti-Terrorism Police Unit stated that one of the attackers had transacted at least 1 million US dollars (100 million Kenyan shillings) through mobile money, several months leading to the attack (Xinhua, 2019). It was also reported that one of the alleged terrorists had received 90,000 US dollars from South Africa using 47 Subscriber Identification Module (SIM) cards in the months leading to the attack (Xinhua, 2019).

Whereas the mobile money tool has been instrumental in bringing into place enhanced money transfers and instantaneous business payment modes, the various risks related to money laundering (ML) and terrorism financing (TF) across national and international jurisdictions is sure premise to deliberate upon the mitigations that can be set up in consequence.

GENERAL MOBILE MONEY TRANSACTION FLOW

Before the advent of mobile money on a global scale, money transfer from one person to another was mainly via formal means or where possible it was expedited through agents or third persons, who characterized the informal means. For quite a while, in the developed economies, the electronic transfer of funds via the internet and using credit cards dominated the money transfer space. Also, organizations such as Western Union and MoneyGram played a great part in international money transfer. In most parts of Africa, the informal way of sending money applied so often, with people sending others going to the destination of the anticipated recipient of the money to help deliver the money.

Often, this was slow and unsecure due to the processes it had to go through. The invention of mobile money brought life of its kind in the money transfer realm, making it more convenient, safe and quick for the persons using the platform. For instance, in Ghana, as soon as the *MTN Mobile Money* was introduced into the market, person to person (p2p) money transfer totally transformed (Mattern, 2017). Settlement of debts, financial gifts and all person to person money transfers slowly moved to the use of mobile. This later set pace for the entrance into the same space by the *Airtel Money*, *TiGO Cash*, and *Vodafone MPESA*. The challenge that the baffled the users for a while are the credibility of the service that proved reliable with time.

P2P mobile money transfers and payments to other business transactions has now become part of people's lives and their financial engagements. In Kenya, two thirds of the adult population is using the mobile money transfer of funds and payments mainly *MPESA* and about 25% of the country's GDP flows through the platform (Munda, 2019). In China, the number of users using *Alipay* is more, standing at 800 million by the end of 2013, compared to those using the internet (600 million) (GSMA, 2014).

In the decades past, once the customer found their desired goods or product, there were not many modes through which they could make their payments to the business from which they were buying

except by cash or bank in the case where amounts were huge. However, that is not the case since mobile money has made it easier, providing a number of ways to make payments beyond the conventional. In Kenya for instance, businesses have incorporated the mobile money account numbers in their advertisement in order to make it easy for the customers (Ignacio & Radcliffe n.d) Sometimes, the customers may make a purchase but they do not have cash, but find very convenient to clear the business using the mobile money in their accounts.

With this enhanced modes of payments and funds transfer, it will be unwise to turn a blind eye on the financial crimes that can take place in the process. One of the incredible risk measures that the Kenyan telco, *Safaricom*, has put in its mobile money transfer platform –*MPESA* is the ‘reverse’ option. It is a feature that helps an individual to retrieve their funds whenever they inadvertently send money to the wrong person or pay to the wrong business account in the case money transfer or making payments. Individuals and businesses alike are exposed to financial crime in this space, in terms of faked identity, money laundering especially in big businesses such as insurance, stock brokerage and investment firms.

MOBILE MONEY LANDSCAPE: OVERVIEW OF CURRENT AND EMERGING TECHNOLOGIES

The Digital inclusion efforts put forth by governments in emerging economies and telecommunication firms, with the intention of connecting population and ignite the sprouting of business opportunities, have sparked a new paradigm of viewing the mobile technology space. Further, it has accelerated the creation of a good platform upon which a number of inventions have thrived and risen to full-fledged technology businesses. Mobile money (M-money) is one of those technologies that have enjoyed this enabling environment.

As 2003 was coming to an end, there were just slightly above one billion unique mobile subscribers globally, which implied that under one in six people had a subscription with a mobile service (GSMA, 2014). Exactly a decade later, by the end of 2013, this figure had dramatically increased to 3.4 billion unique subscriptions, with 6.9 billion SIM connections - slightly below half the world population at the time (GSMA, 2014). In 2019, with an estimated world population of 7.7 billion, there are 5.112 billion unique mobile subscribers –having a 67% penetration (DATAREPORTAL, 2019).

On the other hand, internet penetration is certainly one area that can be noted to be moving and growing in tandem with the mobile technology penetration and the advancement of the inventions emanating from efforts put into place to leverage the ease the way of doing business such as mobile money. In 2013, there was noted an accelerating growth of the high speed 3G and 4G network connections particularly in the developing countries and it was estimated that two thirds of the global mobile subscriber base utilizing internet would be connected- from the then one third coverage (GSMA, 2014). In 2019, Data Reportal (2019) confirmed that about 4.4 billion internet users globally, with a 57% penetration level. Startlingly, that was a 9% increase from 2018’s figure, represented by 366 million new internet users (Data Reportal, 2019).

With this notable proliferation of mobile internet and smartphone access particularly in the emerging markets, mobile money has found such a hub that has aided it manifest itself in multiple facets that have transformed the way economies are run. As a matter of fact, it has called for a reinvention of nearly all traditional financial markets’ business models to suit the end users who are now inclined to the usage of the mobile services, which is characterized by quick, efficient and instant needs (Mirfin, 2019). One

of this is the mobile-based banking, a feature that has proved to be crucial for a substantial number of banks to embrace to in constant touch with their customers.

The banking industry has come to an inevitable resolve that the banking space has tremendously evolved and majority of their customers are highly mobile with a connection with the internet. As such, most of the major retail banks globally have embraced the use of mobile apps to effect most of the traditional functions that required the customers to go to bank branches such as depositing, check account balances, withdrawing and applying for and servicing commercial loans (World Bank, 2014). Global Financial Inclusion Database released by the World Bank in 2014 indicated mobile banking had already started gaining tract and Botswana was leading in its popularity (44.5%), followed by Kenya(39.7%) (World Bank, 2014). South Korea, Sweden, the US and Australia are the other non-African countries that featured in that top ten list, implicitly showing that African countries had features in their mobile industry that accelerated the widespread use of mobile banking services amongst its population.

By the end of 2018, Juniper Research (2018) predicted that on a global scale, 2 billion people would be using their smartphone devices to access the digital banking services – an estimate of 40% of the world's adult population. The research also found out that with the increased adoption of the platform for banking especially in some of the key emerging economies in the globe such as China and India, it implied that the mobile banking users were a representative of 50% of the banked population around the world. Mobile banking has become an integral part of the banking financial services sector, with regions such as Eastern Europe increasing their market share to 47% in 2019 from 28% in 2018 of all the global mobile banking users(Eisenberg, 2019)

In countries such as Kenya, the mobile banking services which are facilitated in the form of applications have gone beyond the conventional banking services, to allowing customers to transfer funds from account to account, buy airtime, pay bills, account monitoring and even blocking their automated teller machine (ATM) cards whenever they may think they are at risk for whatever reason. In extension, the banks have also joined the now prevalent micro-loans space. Regional giant banks such as Barclays Bank, Housing Finance Group, Equity Bank, Cooperative Bank and Kenya Commercial Bank (KCB) have developed ingrained features on their mobile banking platforms to give out micro-credit services with short payment periods, often one month. One of the most effective loan platforms in the region has been KCB-MPESA, a loan facility provided by KCB in collaboration with the regions biggest mobile funds transfer platform, MPESA –having a systematic way of rewarding loans to its customers. In Nigeria, a similar scope of business with mobile banking with avenues such as the *Mainstream* loans wired and supported by the local banking players (Juniper Research, 2018).

Having come in handy in settling the headache that comes with lining up at the banking halls to wait for possibly hours in order to be served, the mobile banking technology, which has often been termed as an ideal solution, is plagued by a couple of risks. While the mobile use penetration especially in the developing economies has reached unprecedented levels, it is apparent that most of the current users are not necessarily computer literate nor are they educated in matters financial services. Individuals from all walks of life are compelled to use of the mobile banking services for their convenience, thanks to the easy nature of usability of most of the apps. They certainly lay their trust of their information in respect of the tool on the financial services providers. Notwithstanding, customers are often at risk since they would not be keen enough on verifying if the information they offer falls in the right or wrong hands, in which case if the latter occurs they stand to lose their financial resources by way of being swindled.

Individuals have not come to the realization that mobile devices can be hacked and attacked just as it happens for notepads and computers. In recent times, the mobile devices have become the soft targets

for hackers. In this realm, the downloading of infected apps has become one of the most threats that mobile devices face. Once installed, knowingly or unknowingly, these already infected apps perform the malicious tasks for which they have been programmed, thus rendering the mobile banking user absolutely vulnerable and susceptible to being a victim of financial crimes (Catri, 2013). Checkpoint (2019) asserts that Wi-Fi, OS exploitations, SMS attacks, zero-day malware and device settings are some of the major threats that mobile devices are exposed to. Certainly, cybercrime and financial crime are stubborn confederates in this context. Penetration of the mobile devices' use and internet in developing countries like Kenya and Nigeria is praiseworthy, but it comes with a heavy price that calls for deep contemplation on setting in place watertight mitigation measures.

Checkpoint (2019) indicated that about 14 million devices were hit the *Copycat* mobile malware on a global scale in 2018, while those devices that were hit and injuriously affected another mobile malware –*Hummingbad* - summed to 10 million. Also, in respect of the fake apps that were installed totaled to 4.9 million, all resulting from the already infected devices. Further, Checkpoint (2019) noted that in 2018, hackers leveraged the use of dormant accounts to siphon huge chunks of money banks maliciously. Therefore, these malicious innovations put users of mobile banking at risk and stand to be a major stumbling block to the advancement of the use and trust of this useful technology (Checkpoint, 2019).

Mobile Loan Apps

Mobile money has never been as active as it is currently with the rise of mobile applications that readily provide instant loans to the individuals in need of credit; to be repaid after specified times at an interest. Besides the mobile banking apps that offer loans, these mobile loan apps are solely meant to offer nothing else but loans. In order to show just how this space has mysteriously grown over the years, in a global scale, the mobile money providers in terms of loan services increased to 73 per cent in 2017 from 38 per cent in 2014 (GSMA, 2018). The improved smartphone access to a greater global adult population in regions such as Sub-Saharan Africa, South Asia, Latin America and Caribbean, can be attributed to the growth in the demand and yearn for the mobile loans.

Mobile loan apps business minds noted that what most of the population found out money to be relatively elusive, especially for the very time that they needed it to effect a transaction or make some sort of payments (Owuor, 2019). The fact that they are able to provide that facility at convenient times, with little or no requirement of a security as in the case of traditional banking service, makes the loan apps more attractive thus easily embraced. With this premise, the aspect of digital lending through the mobile loan apps has taken the microcredit space by a storm, inevitably changing the manner in which access to funds is viewed and treated especially in the developing economies.

In some countries, due to the high interest rates charged by the local banks when it comes to offering loans, the micro lending sector by banks has been stringent. As such, a time when people are desirous of easy and instantaneous solutions to most of their challenges with the wake of the digital age and access to the internet, including financial, the sprouting of alternative lending platforms has become compulsively necessitated. Nigeria is such an example, where the lending in the banking sector has been minimal due to various reasons, chief among them being the high defaulting levels of the customers who borrow in the economy for business, but more especially for consumption. In fact, due to this alarming phenomenon, the Central Bank of Nigeria compelled the banks to lend more, asserting that they should use 60% of their deposits to give out loans by the end of September 2019 (Brazil News.Net, 2019). It came in with a threat to have the cash reserve increased for the banks that do not lend more to the Nigerian public.

The Nigerian banks are considered to be among the most reluctant lenders amongst the major emerging markets, having an average of below 60% loan-to-deposit ratio (Brazil News.Net, 2019).

Notably, the large population of Nigeria has been forced to gullibly rely on the services offered by the myriad mobile loan apps to their various financial needs. The *PayLater Loan App* has been the leading mobile loan app that has virtually found its way to becoming part and parcel of the lives of the most poor and middle-class population in Nigeria. It is preferred due to the high speed with which one can access a loan –in less than five minutes –and get to pay later, for a period spanning from 15 days to 6 months without collateral or any documentation. Whereas, on average, most Nigerian commercial banks charge between 18% and 36% on the personal loans they offer to the Nigerian public in addition to requiring collateral, the *PayLater loan App* charges only 15.5% rate per annum, making it more attractive (ValuePenguin, 2019). With this service, customers are able to recharge airtime, set up transactions that are to be effected in the future specified date, pay for utility bills -GoTV, DSTV, LCC, Bet9ja –send cash to family and friends etc. It is a feature that has equally been replicated in a number of other mobile loan apps in the country such as *Branch Loan App*, *Sokolooan App*, *Palmcredit Loan App*, *ALAT Loan App* and *FairMoney Loan App*.

In other jurisdictions like Kenya, the mobile loan apps have turned out to be quite extortive in their nature due to their relatively high interest rates in comparison to the mainstream bank loan rates. Kenyans pay very high interest rates to access the loan facilities, ranging on an average of between 10% and 14% per month (Nzayisenga, 2017). Global lending apps such as *Tala* and *Branch* have taken the local mobile loan business by storming to the extent of seeking more funding from financiers in the Silicon Valley in order to meet the high demand for loans by their customer base (Dahir 2019). The stringent economic times in the economy has compelled the majority of the adult population struggling with sustaining their livelihoods to result in depending on the mobile loan apps in order to meet their daily financial needs. On the other hand, a number of individuals have used the loans in order to start and scale up their business ventures, a feature that calls for applause since it effectively advanced their livelihoods without undergoing the shrewd lending terms in the mainstream banking sector. More mobile loans have thus sprouted in the region, including, *Shika LoanApp*, *Saida Loans*, *Okoa Stima*, *Zidisha Loan* and *Haraka*. Nearly all these apps have recorded a growing revenue base over the years.

In Kenya, the establishment of the Credit Reference Bureau (CRB), an entity that monitors and regulates the creditworthiness of an individual, has by far and wide fueled the thriving of the mobile loan apps (Xinhua, 2019). This is essentially because the customers taking the loans are cognizant of the fact that they shall be listed in the CRB and thus render unsuitable to take other loans in the future. This effort in regulation has to some great extent helped sanitize the borrowing craze, although it has in several occasions led to individuals contemplating suicide in the event when they did not manage to pay back their loans (Nzayisenga, 2017). Due to increasingly spiraling levels of poverty in the various regions in the developing economies, much of the borrowing done on the mobile loan apps is sadly used on personal consumption or put into uses that cannot be directly traced back to business gain. As a result, once consumption has been effected, there lacks means of making repayments when the loans fall, thus throwing individuals into deep debts. Either, it has also nearly become a norm in some countries like Kenya, whereby, borrowers on the mobile loan apps have found themselves in what can be termed as a debt trap as a result borrowing from multiple platforms for repayment purposes due to lack of a plausible repayment plan (Munda, 2019).

The major financial risk likely to hit hard the mobile loan apps is money laundering (ML). Essentially, the mobile loan apps are in the business of credit-only service provision. There are no clear regulations

put in place across the emerging economies to be able to clearly carry out a thorough scrutiny on these firms to ascertain the source of the funds that they lend out to the public. This informational gap on the side of financial regulatory institutions and anti-money laundering entities is a huge doorway to the manifestations of financial crime. Monies illicitly acquired can easily be channeled into these apps for sanitized, and thus leading to an exposure of the economy to the evils that emanate from money laundering. The perpetrators of the illicit businesses and schemes will gain tract since they will find a safe haven through which they can enjoy their ill-acquired profits without being caught by authorities thus face no repercussions. For economies that are up to encouraging legit businesses among their people for fair and healthy competition, when money laundering finds its way to the mobile loan lending unnoticed in the emerging markets, there will more social evils will bluntly come out bare such as drugs in the streets; more fraud in the corporate space risking pensions for workers and collapsing of companies in the financial market space (Catri, 2013). Further, Juniper (2018) affirms to the fact that, losses in tax revenue will have to be made up for by the already impoverished persons in the emerging economies, ultimately yielding to a stiff financial strain that tremendously curtail any economic progress. The million dollar question now is why the regulatory entities are not yet able to tame this potentially deleterious phenomenon in the financial services space.

Calls for the financial regulators and the legislators for the various jurisdictions to come up with regulatory measures for the mobile loan apps must be heightened for the health of the financial space and safeguard of the users. One of the ways to effectively track the possibility of money laundering as being part of the drivers of the mobile loan apps is the establishment of concrete operational regulations (Catri, 2013). It is evident that with the evolution of the technology, the traditional financial regulatory provisions in the Banking Charters cannot be able to sustain the needs of this nascent digital space. It will be crucial to man and regulate issues such as the mobile loan apps' terms and conditions of their products, customer complaint processes, assert and disclose to the regulators their consumer data protection and privacy policy and any allowance period they give for purposes of cooling off in the instances of conflict. These regulations having the backdrop of possibility of money laundering in the mobile digital loan apps not only protect the customers but also the economy at large as an entity since the funds borrowed and lent are flowing within the economy (GSMA, 2014).

Social Payments and Social Shopping

With the invention of social media sites and tools over the past nearly 15 years, connecting people through messaging, video calling, live streaming, photo sharing etc., the future of digital transformation is now inclined to social payments and social shopping. Undoubtedly, since majority of these tools are accessed and utilized through the mobile devices, mobile money will be a key integrating feature when it will come to closing deals and transaction on those sites. What is not clear though is whether the emerging markets and globe in general is equipped enough to manage any financial crimes that are likely to creep in through this technology.

Ideally, social payment involves the utilization of social media in the transfer of money from one person to another or from a person to a business. Features to effect payments from money transfer platforms are incorporated in the social media apps in order to assist in the transactions accordingly. *PayPal* can be noted to one of the pioneer platforms used to popularize this technology, but we have since seen similar features being hatched by other social media platforms such as *Snapcash*, *WeChat Pay*, *Venmo*,

Twitter Pay, Apple Pay and Google Wallet. This robust growth of m-Commerce implies that we should expect to see improved merging between social networks and m-Commerce in the future.

In China, for instance, there were 31% of the users of *WeChat* already actively using its purchasing features by April 2019, when the company launched a new feature called “Good Product Circle” (Pan, 2019). This feature allows the users of the platform to be able to share various e-commerce Mini Program stores with their friends, effectively creating demand shopping more conveniently and seamlessly. The integration makes the users to share products of any kind from other platforms and then interact with their friends using the same feature (Pan, 2019). Arguably, Pan (2019) points out that the social shopping sites will leverage on the acquaintance recommendations thus assuring some credibility of the product at hand, as opposed to the sometimes supposed fake ads that are meant to influence a potential customer to buy, only to have a terrible experience with product when they receive –feeling less value for their money.

With the notable cybercrime scenes in the past few years, financial crime is an imminent tragedy yet to hit the social shopping space. It will have to take the regulators and the firms an extra effort to close loopholes that could give way for fraudulent persons from siphoning funds from unsuspecting users of these social apps. Either, the mobile money payments through these social apps is prone to fueling acts of money. This is more so because, anonymity is part of the process of ‘cleaning dirty’ money, and once the masterminds of money laundering manage to register fake accounts, they are likely to accomplish their heinous acts without the possibility of ever being caught. It is certainly not clear if these social sites have amicably managed to put in place the right Anti-Money Laundering (AML) measures such as keeping the records of transactions, setting limits of amounts of money that can be transferred on accounts with certain times and generally critical and keen monitoring of the transactions taking place on level of the system (Pan, 2019).

In addition, in light of the users of the social networking platforms using their acquaintances with individuals as a basic basis to accept recommendation for particular products on sale, there lays a risk of identity theft or account takeover. This will result in fraudulent dealings that will hurt the users, rip them of their finances and possibly render the platforms unpopular. FinTech companies working upon which the mobile money payments is based in the context of the social shopping and payments will have to develop proper terms and conditions to guide and govern the social payments (Datareportal, 2019).

Mobile Money and Terrorism Financing (TF)

Whereas mobile money has tremendously transformed the way of doing business and transfer of funds from one individual to another, the rate at which it is being misused to harm the very people in various jurisdictions that it serves is indubitably alarming. One of the debasing roles that mobile money has come to play in making life difficult for nations is terrorism financing (TF). TF can be defined as the acts that support the flow of funds to terrorists or non-state actors (Catri, 2013). It is a global phenomenon that keeps raising the economic and political antennae of nations, often begging for a concerted effort in order to curb it. The technology of mobile money came at a time when the national financial intelligence units (FIUs) were not utterly prepared to tackle it and hit it by its very root.

High level criminals such as the terrorists possess some sense of sophistication and knowledge about their target victims to such an extent that it requires an equipped anti-terrorism team to be able to dismantle their tact. The International Convention for the Suppression of the Financing of Terrorism (1999) and the Security Council resolution 1373 (2001) urge states across the globe to be vigilant enough to “prevent and suppress the financing of terrorism, inter alia, by criminalizing the collection

and provision of funds for terrorist purposes, and urges them to set up effective mechanisms to freeze funds and other financial assets of persons involved in or associated with terrorism, as well as to prevent those funds from being made available to terrorists” (UN, 1999). While this is an international resolution that is being acted upon by high level intelligence, when the sinister perpetrators and supporters of terrorism find out any loophole to this end, they tend to leverage it to undermine and water down any preparations put in place. Mobile money has proved to be an effective and insidious tool that terrorists have found lobby for funding in order to expedite their acts of cowardice.

Appearing more frequently on the world’s map for the same reasons, Kenya has possibly seen the different facets of terrorism financing in its fight against the Somalia-based militia, Al-Shabaab than most nations in the emerging economies. It is certainly distressing that it has suffered the spread of this evil under the fuelling of its reputable mobile money innovation –MPESA. It is one of the most performing mobile money platforms in the continent, and now made its reputation known all over the world –users can send and receive funds from other countries in the world, over 200. As at December 2018, the mobile money platform had 30 million customers. On overall, with the total of about 48 million mobile money subscribers in Kenya, a record of Sh. 3.98 trillion was transacted in 2018 and Sh. 270 billion came into the country majorly from North America and Europe (CBK, 2019). It was noted that is within this period that huge chunks of money were transacted through the mobile money platforms to plan and execute the terrorist attack at a Nairobi based business complex, DusitD2 complex on 15th January 2019, leaving 21 people dead (Wechsler, 2019)

About four months leading to the attack, one of the suspects arraigned in court for financing it had received up to Sh. 100 million (US\$ 1 million) that he later sent to the terrorism group based in Somalia (Ahmed, 2019) The amount was withdrawn from the bank in little chunks before distributed to other individuals via mobile money. Another suspect also received Sh. 9 million from South Africa, withdrawn to the *Mpesa* and then sent to individuals noted to be part of the Al-Shabaab outfit based in Somalia. CBK (2019) further indicates that prior to this act, the second suspect was found to have registered 47 SIM cards between the months of October and December in 2018 which were used to seamlessly carry out the mobile money transfer without being noticed nor suspected. This particular incident affirmed to the possibility that terrorist sympathizers have an easy way manoeuvring around the loose regulatory environment in respect of the mobile money business, which does not necessarily provide for a deep knowledge and understanding of the background of the users, to do plan and support the terrorist activities with little hindrance.

From a report released in October 2018 by the Central Bank of Kenya on the Financial Sector Stability, very few among the digital outfits such as the mobile money apps had comprehensive information about the nature and business of their customers. It possibly did not matter to them, in the sense that all that is crucial is that they lend and have the loans repaid in good time with interest –business in its simplest form with respect with their mandate. However, this gives a huge opportunity for terrorists to receive their services, thus implicitly financing a rogue cause. There stands to be a significant gap in the level of scrutiny conducted by the mobile money operators across the emerging economies to ascertain the sources of funds being moved, and whether the individuals receiving or sending cash are doing so with the right intentions. Consequently, some of the concerns that still beg for a more elaborate deliberation are that, expansion in the usage of mobile money payments and other digital credit is seemingly creating a predisposition to financial crime risks –money laundering, technology risks and terrorist financing on the developing economies (Isaac Akomea-Frimpong, 2018).

With respect to the financing of the Somali-based terrorist group, Al-Shabaab, a report by the US Bureau for International Narcotics and Law Enforcement Affairs published in 2015 established that the main financing for terror activities is by mobile money and Somali's hawalas. Hawalas in the Somali community are the agents who act as remittance banks (Thompson, 2007). Hawala featured prominently during the 9/11 attacks as having played a pivotal role in funding it, coming out in the eyes of the non-Muslim world as a "black" channel through which terrorists moved funds. Following the infamous attack in Kenya in 2015 at the Garissa University that left 148 students dead, thirteen firms associated with playing a role of hawalas in financing the attack were shut down over a State crackdown (Thompson, 2007).

In West Africa, besides the porous borders that allowed the terrorists to transfer material resources and funds across and support from charities and Non-profit organizations (NPOs) to finance terrorist activities, online and mobile based money payments have come in handy in the facilitation TF (Mirfin, 2019). ML has been part of the tools used to support terrorism without the knowledge of the state, particularly from rich business owners who are part and parcel of the sympathizers of the infamous *Boko Haram* terrorist group in the region. Further, with widespread use of mobile phones in the transfer of funds, according to one of the suspects brought to book in 2012 following the November 4 2011 attack by the *Boko Haram* that left 148 people dead including police officers, the militia group receives already registered Subscriber Identity Module (SIM) cards from members of the public that were sympathizers to the terrorist activities (FATF, 2013). These kinds of SIM cards can then be used in the transfer of funds from multi-agencies, local and abroad, to communicate and receive huge amounts of finances through the mobile money platforms and online payments, effectively equipping the terrorists with the resources they need to ignite fire on innocent lives in the West Africa region indiscriminately (FATF, 2013).

The future of the countries prone to attacks by terrorists is at stake if the advancements in the technology of mobile money grow at a faster speed than it can be regulated to arrest the unexpected criminal activities as soon as they pop up. The policy makers in the various states have a responsibility to create principles on responsible finance which may include regulations on consumer protection, development of the pragmatic codes of conducts to be followed by the financial services players especially those that are leveraging on the mobile money as part of their business models and instilling mechanisms in place to assure financial integrity. Part of the reason which has made ML/TF possible is the fact that state financial regulators such as central banks do not have elaborate regulatory policies that assist in the management of the nonbank financial services firms (UN, 1999).

Mobile Money Regulation in Relation to ML and CFT

Essentially, the telecommunication firms are meant for facilitating communication and access to internet, but the invention of the mobile money to their platforms is not a space that had originally been in any regulation. Therefore, legislation on how these online financial platforms ought to be managed is crucial, so that financial providers of mobile money are able to provide their risk mitigation measures with respect to money laundering (ML) and assuring a firm policy on combating terrorism financing (CFT) (Ghanaweb, 2019). These platforms move huge volumes of money on a daily basis and therefore it the state agencies and regulators would want to be keen at following up to ensure that good business takes and not activities that will highly undermine the state security. Moreover, from the scenario in Kenya where the key player in financing the DusitD2 attack who happened to be an agent of the mobile money provider, a more smart and flexible oversight is needed to restrain the activities that these may do to effectively fund terrorism.

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On the other hand, the Financial Action Task Force (FATF), being an intergovernmental body that recommends countries on CFT, there have been reactive nature to terrorism attacks around the global, in light of the manner of financing. It will be more prudent to have a collaborative engagement with the state parties such as the Financial Intelligence Units (FIUs) order to effectively influence the strengthening of policies that are engulfed with loopholes that terrorism financiers could leverage on. An informed government in matters terrorism planning and financing will be to act more proactively towards possibly freezing the accounts involved in the transfer and arraign the suspects to courts of law. It is clear from the precedents of terrorism in the emerging economies in the past decade has often caught the government and state security agencies by surprises, even when it is later confirmed that it took months and months of planning (Mirfin, 2019). FIUs should stay abreast of the developments in the digital payments, more so the mobile money, to gather intelligence that can guide in the establishment of the right tact to bring to book terrorist financiers.

Regtechs are certainly one of the latest technologies in the Fintech space that regulators in the financial services industry can use to mitigate any risks that mobile money may involve. With regtech tools, regulatory requirements for the nonbank financial services such as the mobile money firms, “nimble, configurable, easy to integrate, reliable, secure and cost-effective regulatory solutions” can be developed to grab financial crime perpetrators by their necks (Checkpoint, 2019). It would remain a continued crisis if such deliberate efforts are not taken to ensure that even people and business enjoy the mobile money technology, it does not turn out to be the tool that effectively wipes them out over terror attacks.

CONCLUSION

Presently settled in most of developing economies, versatile money related administrations are entering another stage in their advancement. Portable cash, specifically, has turned into a key area of interest as nations continue to develop interests in portable frameworks and further adding to budgetary consideration and financial advancement.

On the same breath; it is more than apparent that more needs to be done to contain financial crimes such as money laundering and terrorism financing. P2P mobile money transfers are at an all-time fast speed, but there lies the tragedy too that with the same pace, terrorism activities can be financed and executed. Through the mobile money loan apps, due to the limited knowledge of the customers at the hands of the service providers, terrorists have a far from being elusive source of funding to help them plan their heinous acts. FIUs would want to dig deeper into the issue of money laundering and terrorism for these reasons so that the evils do not rob the emerging economies of good people and the opportunity to grow legitimate businesses that will compete in the world market.

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Section 4

Mobile Services, User Expectations, and Social Impact

Chapter 24

Mobile Payment and Its Social Impact

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ABSTRACT

This chapter describes mobile payment, a mobile financial activity born of digital revolution, which is the combination of electronic money and mobile technology. The underlying technologies of mobile payment, its big players, and its status quo and future trend are discussed. In addition, this chapter discusses how mobile payment is related to social equality and social inclusion. Through presenting the historical, technical, economic, and social aspects of mobile payment, this chapter intends to provide readers with a holistic view of one of the fast-evolving financial activities that are transforming business, individuals, and the society.

INTRODUCTION

If you stand in the checkout area of a shopping center and observe how customers make payments for their purchases. You probably could notice that some are using cash, some are using checks, and most are using a plastic debit or credit bankcard, and very few are using their mobile phones. That is the case in the United States and most European countries. However, if you visit some big cities in China, you will find more people are using their smartphones to make payments. Because this kind of payment is made through mobile phones, it is called mobile payment. Although mobile payment is relatively a new payment method, as one of the outcomes of digital revolution, it could have huge impact on our life and society (Haig, 2002).

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Currency, as the standard exchange medium between sellers and buyers, was first utilized about 500 BC (Ferguson, 2008). The original forms of currency are coins made of precious metal, such as gold or silver. The usage of banknote (paper currency) began about 700 AD in China. Because paper currency has many advantages over metal currencies, it was gradually adopted nationally in China around 1100 AD (Friedman, 1994). Then, nearly 1000 years later, electronic money (e-currency) was introduced within the modern banking systems (Weatherford, 2009). Examples of e-currency include bank deposits, money transfers, and electronic payments with checks, credit cards, or debit cards. E-currency, money in its digital form, is stored in a computer system that can be accessed through bank tellers, ATM machines, POS (Point of Sale) terminals, landline telephones, or computer network (Gup, 2003). The apparent advantage of e-currency over paper currency is convenience. Therefore by 2000, e-currency became the major payment method in developed countries, such as Europe, North America, and Japan. However, at that time, paper currency was still the major payment method in developing countries, including China.

Mobile payment is the offspring of electronic money and mobile technology. With the increasing usage of smartphones, mobile payment gradually enters into our life. It is a new form of e-currency and is replacing bankcards as the new digital payment method (Deloitte, 2015). It is estimated that worldwide, there are about 4.6 billion mobile phone users by the end of 2016, of which about 2.1 billion are smartphone users. This number is increasing dramatically. It is predicted that by 2020, there will be 6.1 billion smartphone users worldwide. As other business activities are moving online (Cunningham & Fröschl, 2013) and to mobile devices, payment is more of an electronic transaction instead of an exchange of paper currency. Electronic payments, especially mobile payments, represent a new dimension of digital evolution, which might shape our spending habits and social relations.

This chapter describes one area of mobile financial services: mobile payment. The objective of this chapter is to provide users with the latest development in this field, including mobile payment technologies, major institutional players, status quo, potential growth, and economic and social impact. The remaining of this chapter is organized as follows. First, the underlying technologies of mobile payment are described. Second, the major financial institutions and technology giants that support and promote mobile payment are introduced. Finally, the status, social impact, and future trend of mobile payment are discussed.

UNDERLYING TECHNOLOGIES

Currently, there are mainly two techniques supporting mobile payment. They are NFC payment and QR code payment. These two techniques are described below.

Near Field Communication Payment

Near Field Communication (NFC) payment requires users to have their bankcard (credit card or debit card) information stored in their NFC-enabled mobile phones. When a smartphone is placed close enough to a device reader at the checkout terminal, the smartphone and the device reader can communicate. Through this process, the bankcard could be verified and the transactions can be conducted. NFC payment is also called contactless payment, because it differs from the traditional bankcard payment, where a card should be inserted into (or swiped over) a card reader.

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NFC is a communication protocol based on the Radio Frequency Identification (RFID), which uses electromagnetic fields to identify and track electronic chips. These chips are used to represent the objects they are attached to (Ahson & Ilyas, 2008; Coskun et al., 2011). RFID has been used in many applications, including name tags, toll collection, logistics, and library book organization, where attached objects could be employee cards, automobiles, shipping packages, books, and so on and so forth. NFC is a specialized high frequency RFID, which is a subset within the family of RFID technology (Thrasher, 2013). In NFC-enabled mobile phones, a RFID tag representing the user's bankcard is embedded as a hardware device inside the phone.

The NFC mobile payments have the same underlying transaction process as payments made with bankcards. In the traditional (contact or contactless) bankcard payment, the device reader reads the card information directly from the card and processes the transaction. In NFC mobile payment, the device reader reads the card information from the RFID tag embedded in the NFC enabled smartphones. Therefore, the RFID tag works like a plastic bankcard.

The transaction process of NFC mobile payment indicates that (1) there is no need for the mobile device to be connected online; (2) bankcard information could be stored in a crypto chip with authenticated access through mobile phone apps, which makes NFC mobile payments relatively secure; and (3) it is easy to use and accordingly considered a user-friendly payment method. In addition, because NFC mobile payment is built on top of the traditional bankcard payment architecture, it is easy for retailers to upgrade their existing payment systems to this new system.

Most smartphones support NFC payment (Alliance, 2011). On nfcworld.com, it lists more than 380 types of NFC-enabled phones. Representatives of NFC-supported mobile payment apps include Google Wallet, Android Pay, and Apple Pay.

As described earlier, NFC payment is based-on RFID technology, which allows two devices to communicate directly. However, RFID is not the only technology available now for contactless communication. Bluetooth, an alternative wireless technology using short-wavelength UHF (Ultra High Frequency) radio waves for exchanging data, is becoming an industry standard and widely used in many applications. For example, Bluetooth allows two mobile devices, such as two smartphones, to communicate; Bluetooth also allows a smartphone to communicate wirelessly with other Bluetooth-enabled devices, such as headphones, speakers, fitness bands, printers, automobiles, and digital cordless phones. All the major mobile operating systems, such as iOS, Android, Windows Phone, and BlackBerry support Bluetooth communication.

Comparing with RFID-based NFC technology, Bluetooth has the following advantages. First, Bluetooth has a longer communication range (over 5 meters) than NFC (about 10 centimeters), which makes the payment transaction a more user-friendly process. Second, Bluetooth payment process is considered faster than NFC, which not only can speed up the transaction process, but also can improve user experiences. Third, Bluetooth is not limited by the one-phone to one-device-reader communication mechanism used in NFC, it can support multiple transactions at the same time from a single device reader, which can further speed up the transaction process for multiple users (Meola, 2016). However, current Bluetooth technology requires a handshaking setup, which could be a tedious process for the customer. In contrast, NFC communication requires no setup time. Accordingly, although NFC is one of the dominant mobile payment technologies, especially in the United States, with the emergence and mature of new technologies, such as Bluetooth, it is not surprising to see that NFC payment will evolve and adapt to the new customer requirement or new business environment in the near future.

QR Code Payment

QR (Quick Response) code is a two-dimensional barcode. It is a machine-readable optical label that contains information about an object (Barrera et al., 2013; Nseir et al., 2013). QR code was initially used in automobile manufacturing industry in Japan to quickly scan and identify automobiles. Because smartphones have built-in cameras, apps can be developed to process the scanned QR code. With the extensive support of smartphone apps, QR code now has a wide range of applications, including package tracking, transportation ticketing, product labeling, information storing, and information identifying.

There are three ways QR code could be used in mobile payment. They are (1) buyer-to-large retailer transactions, (2) buyer-to-small business transactions, and (3) peer-to-peer transactions (Garg, 2015). These different payment approaches are detailed below.

Buyer-to-large retailer transactions. Suppose a customer is shopping offline at a local store. During the checkout process, a unique QR code for this transaction is generated on the retailer's terminal computer. The customer scans the QR code using his/her mobile payment app and authorizes the payment. Finally, the retailer receives a notification confirming the payment and closing the transaction. Many department stores, supermarkets, and financial institutions have adopted this payment method, such as Walmart, Target, Starbucks, PayPal, Alipay of China, and City Union Bank of India (Garg, 2015). Using this QR code payment method, vendors create different QR codes for different transactions. Therefore, the QR code here is used as the unique transaction ID for the purchase and for the payment of the purchase.

Buyer-to-small business transactions. For a small business or a retail outlet that cannot generate different QR codes for different transactions, they can employ this payment method. To make a payment, using a mobile payment app, the customer first scans a printed QR code provided by the seller. The QR code contains the seller's bank account information. Second, the customer enters the payment amount on his/her smartphone app and authorizes the payment. The money is then transferred to the seller's account. Finally, the seller receives a transaction confirmation on his/her own computer or smartphone indicating the money is received. The major difference between buyer-to-large retailer transactions and buyer-to-small business transactions is the former generates a unique QR code for every transaction while the later has a permanent QR code representing the seller's bank account. This buyer-to-small business transactions payment method is also used worldwide. Representative apps include Chase Pay from Chase bank, Shell Britain, Paytm of India, Zapper, Alipay of China, WeChat Pay of China, and some Bitcoin transactions (Garg, 2015). The QR code used in this type of transaction could be a posted printout or an image displaying on some kind of devices. In any cases, the QR code is a permanent code.

Peer-to-peer transactions. In this type of transaction, a payee could generate a QR code and share it with the payer through an email or a social-networking app. The payer then scans the QR code and completes the transaction. Both the payer and the payee should receive the confirmation. These peer-to-peer transactions are usually conducted using the same mobile payment app. Example apps include PayPal, WeChat Pay of China, Alipay of China, and Paytm of India (Garg, 2015). The QR code used in this peer-to-peer transaction could be permanent, representing the account of the payee, and specific payment amount should be entered by the payer. The QR code could also be generated on the fly, which means it contains both the payee's account information and the payment amount. Different apps may use different mechanisms.

QR code is also considered a secure payment method, because no bank account information is directly transmitted during the transaction (Lee et al., 2011). However, QR code payments require both

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the payer and the payee to be connected on line so that the transactions can be authorized by the payer and confirmed to the payee.

Comparisons

Both NFC payment and QR code payment are widely used mobile payment technologies (Finžgar & Trebar, 2011). To decide which method to employ in your business, two important factors should be considered: infrastructure and customer habits (Blokdyk, 2017).

To use NFC payment, the merchant should have NFC-enabled device readers. This could be a financial burden for a startup business. In contrast, QR code payments is more affordable and could be the easiest way for a business to go cashless. That is exactly the case in China, even some small outlet vendors have adopted QR code payment.

To use QR code payment, the merchant should make sure the environmental wireless data networks or Wi-Fi networks are reliable and powerful enough to support uneven volume of transactions. Keep in mind, both wireless data network and Wi-Fi network could be vulnerable to the denial-of-service attack, which might paralyze the payment system. In contrast, NFC payment could be more resilient to network attacks (Khalilzadeh et al., 2017).

We are living in a customer-centered business era (Christensen & Raynor, 2013). Customer preference and customer habits are certainly important factors that might influence business decisions (Liébana-Cabanillas et al., 2017). Improving customer shopping experience is the key to achieve our business objectives (Allums, 2014). NFC mobile payment method and QR code mobile payment method might coexist for some time, one might replace another, or they could all be outdated and replaced by some other new technologies. Nobody knows it now. However, one thing is for sure: cash, checks, and plastic cards will be used less and less with the evolution of information technology.

MAJOR PLAYERS

Mobile payments grow rapidly worldwide. The total revenue of global mobile payment of 2015 was \$450 billion. It is estimated that this number will be doubled in 2018. Now let us look at some big market players in the United States, China, India, Europe, and beyond. Mobile payment is the application of mobile technology on financial market. Accordingly, the influential players in mobile payment industry are tech giants and big financial institutions.

Google

Google Wallet is Google's first peer-to-peer electronic payment system (Ghag & Hegde, 2012). Each user's Google Wallet is linked to the user's bank account. Fund can be transferred between two Google Wallet accounts through mobile phone apps. Traditionally, Google Wallet allows users to make payment at some physical stores. Making payments through Google Wallet is free of charge for the user. Google's intention about Google Wallet is not making profit, but to build an e-commerce product suite to attract and retain users, because a user's Google Wallet can be linked to his/her Google account, which is a bundle of online Google services, including Gmail, Google+, Google Drive, and Google Doc.

The first Google Wallet app was released in 2011. In 2013, Google introduced a physical wallet card to be used together with Google Wallet. However, this service is phased out in 2016. To expand further into the digital payment business, in 2015, Google launched Android Pay, a built-in feature of Android operating systems. Android Pay is designed for in-store transactions, while the new Google Wallet will handle person-to-person money transfers (Martonik, 2015). It is worth noting that Android Pay utilizes NFC payment method that allows the phone and the payment terminal to communicate when they are placed close enough.

With over 1.5 billion Android devices worldwide, Google wishes that its new payment system, Android Pay, could have a better market position in competing others. Android Pay works with major credit cards and debit cards from most of the top US banks. Currently, near three hundred banks support Android Pay. Android Pay runs in a few countries outside of the United States, including Australia and UK. Given the global market dominance of Android mobile operating systems, it is expected that Android Pay will grow even faster in the next 5-10 years.

PayPal

PayPal was originally launched as a money transfer service in 1998 to facilitate C2C (Consumer to Consumer) e-commerce transactions. When an item is sold online, the payment would be credited to the seller’s PayPal account instead of a bank account. This process makes the transaction more convenient and secure. After PayPal was acquired by eBay, the leading C2C e-commerce website in 2002, it became the major payment method of eBay users (Jackson, 2004).

Since partnering with MasterCard in 2007, PayPal could be linked to a MasterCard and used offline at brick-and-mortar stores. Later, peer-to-peer money transfer feature is added to PayPal. In 2016, PayPal’s NFC mobile payment is launched to support Visa and MasterCard.

Currently, PayPal has 188 million active accounts. This number doubles what it had in 2010. Figure 1 shows PayPal’s annual mobile payment volume. Table 1 compares PayPal’s total payment volume with its mobile payment volume in 2014, 2015, and 2016. Although only a small portion of the total payments are conducted with mobile devices, its fast-growing trend should not be underestimated.

Table 1. Comparison of PayPal’s total payment volume and its mobile payment volume

	2014	2015	2016
Total Volume	\$234 billion	\$291 billion	\$354 billion
Mobile Volume	\$46 billion	\$66 billion	\$102 billion
Percentage of Mobile Volume	20%	23%	29%

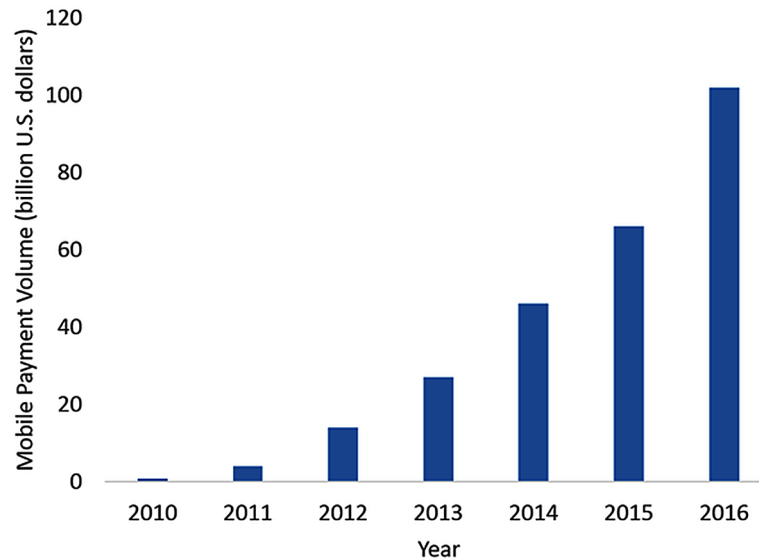
Source: Statista, 2017a; Statista, 2017b.

PayPal is an international payment platform. Currently, PayPal’s service is available in 202 countries with 25 currencies. PayPal’s subsidiary services include Braintree (a mobile and web payment system for e-commerce), Xoom (a money transfer system), and Venmo (a mobile peer-to-peer payment system). It is reported that Venmo will support NFC payment and could accordingly be used in offline physical stores like Android Pay. In addition, PayPal also has its own peer-to-peer payment platform, PayPal.Me.

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Figure 1. PayPal's annual mobile payment volume

Source: Statista, 2017a.



PayPal, as an independent technology-based online payment system, is growing aggressively in several business dimensions through acquiring both startups and potential competitors. Few people have doubt about the future mobile payment market position of PayPal.

Apple

Apple launched its mobile payment system, Apple Pay, in 2014. Apple Pay is designed to provide an electronic alternative to physical bankcard. With stored bankcard, Apple mobile devices, such as iPhone, iPad, and iWatch, could be used to make a payment on NFC-supported POS (Point of Sale) terminals. Like Android Pay, Apple Pay itself does not provide financial services to the customers. Instead, Apple Pay provides mobile payment services for financial organizations. This means Apple Pay will only work on contracted financial institutions. Currently, Apple Pay supports major payment cards (debit or credit) issued in USA, UK, Canada, Australia, China, Singapore, Switzerland, France, and Hong Kong. Table 2. Shows the number of Apple Pay participating banks worldwide.

Table 2. Number of Apple Pay participating banks as of December 2016

	Number of Banks
Asia-Pacific	279
Europe	60
North America	1868

Although Apple Pay is only about 3 years old. It grows at an unprecedented pace. In 2015, one year after its launch, Apple Pay registered a total of \$10.9 billion transactions. In 2016, Apple Pay recorded a 50% growth in the number of monthly credit card transactions over 2015. The latest quarterly result of Apple released in May 2017 indicates that Apple Pay transaction volume is up 450% year over year.

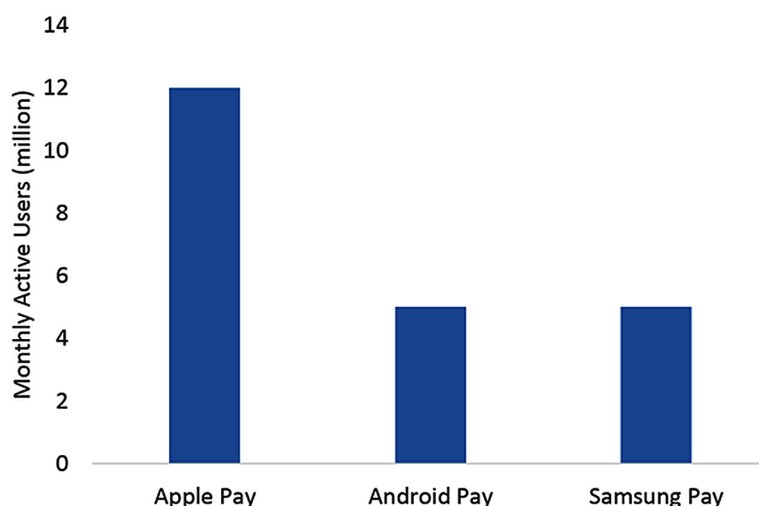
Apple's mobile operating system iOS is second in the mobile operating systems marketplace next to Android. Most importantly, users of Apple products, such as iPhone, iPad, and iWatch are mainly located in developed countries, such as North America, Europe, and Asia-Pacific. It will be relatively easier for those customers to adopt mobile payments. In contrast, besides developed countries, Android is also used in emerging markets, such as Southeast Asia, South Asia, and Africa. In addition, Apple product users are usually loyal Apple fans. They would like to use all apple products (hardware and software) of its ecosystem, including Apple Pay (Bruce, 2016).

Samsung

Samsung is one of the largest smartphone manufacturers worldwide. In 2016, over 306 thousand Samsung smartphones are sold to end users. Samsung entered into the mobile payment market in August 2015, when its first app, Samsung Pay is released. Samsung Pay also utilizes NFC technology. In addition, it can be used in POS terminals that only accept traditional magnetic strip and contactless payments.

As of December 2016, Samsung Pay supports payment cards issued in 19 countries including South Korea, America, China, India, Brazil, Canada, Hong Kong, some European countries, and some Southeast Asian countries. Because Samsung Pay is less than two years old. It has a relatively small market share. Figure 2 shows the estimated monthly active users of Apple Pay, Android Pay, and Samsung Pay as of 2016. It is worth noting that Apple Pay has just been launched for two years, its annual growth rate is about 150%. In the United States, three out of four contactless mobile payments are conducted through Apple Pay. However, Samsung Pay is expected to grow faster in Asia-Pacific regions and make impacts on its local financial systems (Son et al., 2015).

Figure 2. Monthly active users of Apple Pay, Android Pay, and Samsung Pay as of 2016



Alipay and WeChat Pay

Alipay is China's e-commerce giant, Alibaba's solution to third party payment. Like PayPal, Alipay was originally launched to support payment in Taobao's C2C e-commerce transactions (Wee, 2012). In C2C business, when an order is placed, the buyer makes the payment and the money is transferred to Alipay. Only after the buyer receives the product and confirms the transaction, the money in Alipay could be transferred to the seller's account. If the order is not delivered or the buyer is not satisfied with the product, the payment will be refunded to the buyer. This transaction mechanism is designed to protect the buyers who make the payment.

In November 2009, Alipay's mobile payment service was launched. Since then, Alipay is no long a pure third-party payment system for e-commerce. After more than ten years growth, Alipay has become the largest mobile payment system in China with about 400 million users. Alipay supports online payment, offline in store payment, and peer-to-peer payment. QR code is mainly used in offline payment and peer-to-peer payment. Alipay's online payment is not limited to e-commerce activities, it is also used to pay utilities bills, medical bills, donations, investment, and tuitions.

Alipay is now one of the many services provided by Ant Financial Group (an affiliate company of Alibaba), which is now valued at \$60 billion. Alipay's business target is not limited to China's market. Ant Financial Group is aggressively growing its business internationally. Alipay's Cross-Border E-Payment Service allows travelers to purchase products or services at international partners' physical stores. The travelers make the payment with Chinese currency RMB to Alipay and Alipay will then convert RMB to USD or local currencies and transfer the fund to the product seller or the service provider. The foreign markets open to Alipay include Europe, USA, and many other countries and regions, where Chinese tourists could directly use their Alipay app at Alipay's partnered stores. This reduces the burden of carrying cash and exchanging currencies. Latest information released by Ant Financial Group indicates that as of May 2017, Alipay can be used in over 200 countries and supports 18 currencies.

Alipay is similar to PayPal. Both of them are born out of e-commerce boom. Now, they are all independent technology-based financial institutions. In addition, Alipay is reaching out to offer more financial products, such as insurance, finance management, and social credit scoring.

Backed up by its tremendous users of WeChat, a social networking app, China's Internet Giant, Tencent launched its own money transferring system, WeChat Pay in 2013. As of March 2016, WeChat Pay has registered over 300 million users worldwide.

Because WeChat Pay is built on top of a social-networking platform, it is ideal for small money transfers between friends, relatives, and businesses. In addition, WeChat Pay provides the backbone transaction services for the social e-commerce built on top of WeChat. WeChat Pay also supports cross-border payments. When Chinese shoppers buy goods overseas, they can pay in RMB by WeChat Pay and the sellers could receive the payment in USD or local currencies.

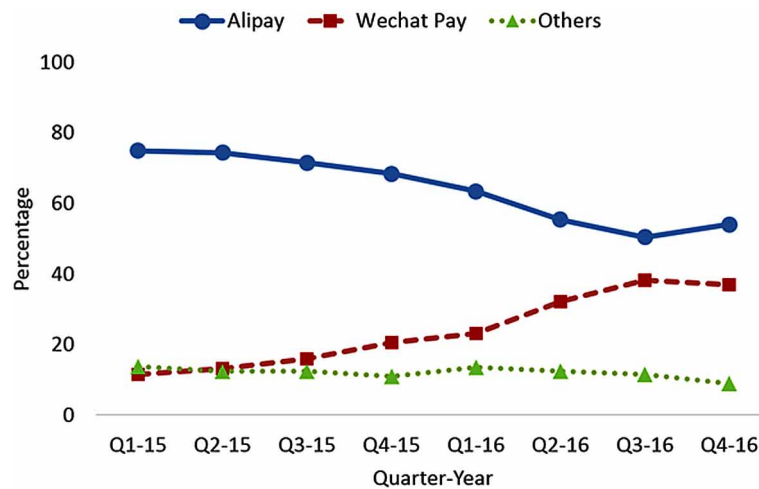
It is worth noting that QR code pay is the major payment method supported by both Alipay and WeChat Pay. There is a good reason why NFC is not widely adopted by Alipay and WeChat Pay: NFC is mainly used to replace bankcard transactions for financial institutions and China has fewer bankcard users; while Alipay and WeChat Pay are registered third party financial institutions, QR code payment is accordingly the perfect alternative to cash transactions. Table 3 compares Alipay and WeChat Pay.

Table 3. Comparison of Alipay and WeChat Pay

	Alipay	WeChat Pay
Parent company	Ant Financial (an affiliate company of Alibaba)	Tencent
Payment method	QR code	QR code
Release date	2004	2013
Independent App	Yes	No (a function of WeChat app)
E-commerce Partner	Taobao.com, Tmao.com, Aliexpress.com, Alibaba.com	JD.com
Monthly active users	270 million	300 million
Currencies supported	at least 18	at least 9
Global expansion	yes	yes

Figure 3 shows the changes of China’s mobile payment market share in the past two years. We can see that although WeChat Pay is released much later than Alipay, it caught up fast in the past years. As supported by the most popular social networking app in China, WeChat Pay has become a major player in China’s mobile payment market, next to Alipay. Other competitive players in China’s mobile payment market include Apple Pay and Samsung Pay.

Figure 3. China’s mobile payment market share
Source: Editorial, 2017.



Paytm

Paytm (Pay through Mobile) is India’s largest mobile payment company. It is launched in 2010. Paytm Wallet can be used to pay online purchases, tickets, taxi, toll booth, and other services. Like Alipay, Paytm uses the QR code payment feature in its app. Paytm was the first to support cashless and cardless payments for small merchants in India. In addition, Paytm is a licensed bank that offers many other financial services.

Mobile Payment and Its Social Impact

It is interesting to know that Alibaba and Ant Financial are major shareholders of Paytm. Betting on the future growth of India's e-commerce and mobile payment, Alibaba and Ant Financial are working with Paytm's parent company, One97 Communications, to develop Paytm into India's Alipay. Table 4 shows the payment data of Paytm. Although Paytm is much smaller than Alipay, given India's market growing potential, it is estimated that Paytm will become a major player in mobile payment industry worldwide (Manikandan & Chandramohan, 2016).

Table 4. Paytm payment data

Total Number of Users	170 million (December 2016)
Monthly Active Users	80 million (2016)
Yearly Transaction	1 billion (2016)
Average Daily Transactions	5 million (2016)
Offline Supporting Merchants	850 thousand (2016)
Valuation	\$6 billion (2017)

Others

Besides the aforementioned companies, there are many medium and small size mobile payment service providers in the United States, Europe, and many other countries. These services include Square, Intuit's GoPayment, VeriFone's SAIL, PayAnyWhere, and LevelUp in the United States, Payam and Barclays Pingit in UK, and Klarna, PayU in other European countries. For example, Zapper is a QR code based payment app; when users locate a Zapper QR Code on their bills either online or offline, they can scan it with their Zapper app and make the payment. Zapper could also be used to pay restaurant bills, utility bills, medical bills, taxi, and movie tickets.

Globally, mobile payment grows rapidly in all continents. For example, it is estimated that mobile payment transactions in Western Europe will grow from €52 billion in 2016 to €148 billion by 2021 (Forrester, 2017). Even in less technology-developed African countries, mobile payments are started to be widely adopted. One of such services is M-Pesa, which operates in Kenya, Tanzania, Afghanistan, South Africa, and beyond (Markovich et al., 2017).

Mobile payment is a technology-based payment method. It has a less than 10-year development history. With the evolving of mobile technology, it will be inevitable to see the emergence of new tech companies or financial institutions that may enter this market and influence this market.

SOCIAL IMPACT

Following e-commerce and social-network, mobile payment represents another shockwave of internet-based technology revolution. Its economic impact could be huge (Shaikh et al., 2017; Kremers & Brassett, 2017; Shrier et al., 2016; Omonedo & Bocij, 2017). For example, as China is moving from a cash-dependent society to a cashless society, traditional banks are feeling the pressure of losing customers and

revenues. New technology-based financial institutions are transforming all kinds of financial activities online. People are embracing the benefits of mobile payment, such as convenience and security.

At the same time, mobile payment also brings challenges and changes to the society. One of the objectives of prompting mobile payment is to support economic growth. However, we cannot have a sustained growth without social inclusion. The following of this section discusses the social impact of mobile payment.

Status Quo

The United States, China, and Europe are undoubtedly the leading markets in mobile payment, mainly due to their internet booms. Table 5 compares mobile payment usages in the United States, Western Europe, and China. Although the USA is a leading market in many internet-based businesses, such as e-commerce, peer-to-peer lending, peer-to-peer renting, and mobile-enabled transport service, it lost the first place on mobile payment market to China (To & Lai, 2014). There are some good reasons behind this phenomenon.

First, in the past, China was a country that heavily depended on cash transactions. Bankcards were introduced less than twenty years ago and were rarely used. Mobile payment is accordingly becoming a favorite cashless transaction method. In contrast, most Americans are using credit cards, and mobile payment has not shown any significant advantages over credit cards. Therefore, the mobile payment penetration rate of the USA is lower than that of China.

Second, most mobile payment in the USA is just another way of bankcard payment, such as Android Pay and Apple Pay. PayPal is an exception. However, PayPal is mainly used for online transactions. In contrast, Alipay and WeChat Pay of China are licensed financial institutions. It is more convenient to make payment and receive money with Alipay and WeChat Pay, especially for peer-to-peer transactions. In addition, both Alipay and WeChat Pay provide many other financial services, which make them more attractive than cash transactions or bankcard transactions.

Third, both Alipay and WeChat Pay are part of their parent companies' internet-based ecosystems, which make them easier to attract and retain users. Alipay is the official payment method of Alibaba's e-commerce websites and WeChat Pay is based-on one of the most popular social-networking apps. Apparently, Android Pay and Apple Pay of the United States do not have these advantages.

Finally, digital payment, especially mobile payment is part of the government of China's plan to promoting the concept of *Internet+* and *one belt and one road* initiative. Through investing heavily on related projects, the Chinese government is aiming at rewriting the world's business order (Swaine, 2015).

Table 5. Comparison of mobile payment in the USA, Western Europe, and China as of 2016

	USA	Western Europe	China
Yearly transaction volume	\$154 billion	\$62 billion	\$5.5 trillion
Number of users	38.4 million	55 million	469 million
Number of users over population	12%	14%	35%

Mobile Payment and Its Social Impact

Another important mobile payment market is India. It is estimated that by 2020, its yearly transaction volume could reach \$500 billion. Like China, India was traditionally a cash-based economy. With the increasing usage of smartphones, it is expected that its mobile payment could surpass cash as the major payment method in the next 5-10 years.

Globally, mobile payment is also growing rapidly (Lerner, 2013; Salmony & Jin, 2016; Phonthanukititithaworn et al., 2015). Figure 4 shows the number of mobile payment users of different regions from 2012 to 2016. It can be seen that in most regions, the number of mobile payment users at least doubled in past 4 years.

Figure 4. Worldwide mobile payment users

Source: Statista, 2017c.

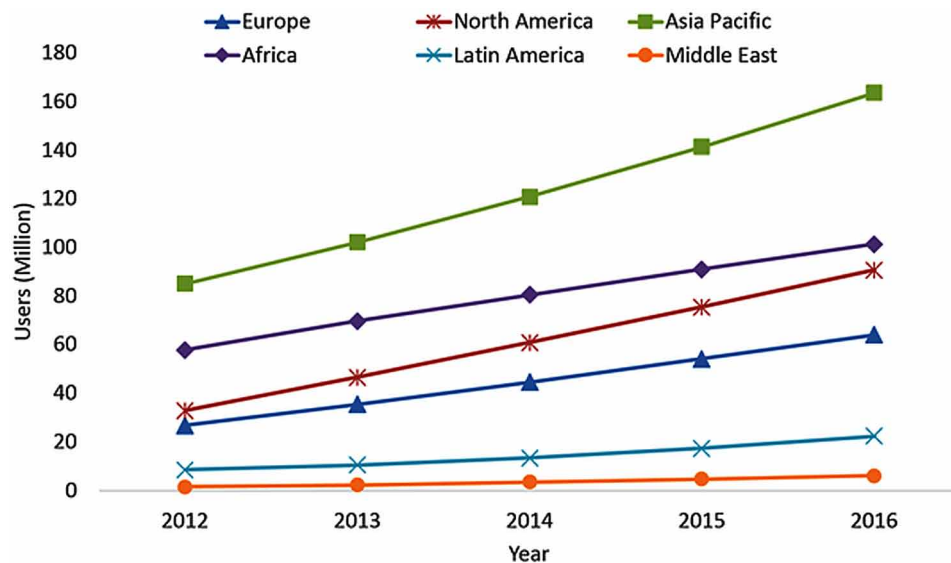


Table 6. Countries with the highest smartphone penetration rate and countries with the lowest smartphone penetration rate as of 2016

Rank	Country	Percentage of Population Owning a Smartphone	Region
High	South Korea	88	Asia Pacific
High	Australia	77	Asia Pacific
High	Israel	74	Middle East
High	United States	72	North America
High	Spain	71	Europe
Low	Burkina Faso	14	Africa
Low	Pakistan	11	South Asia
Low	Tanzania	11	Africa
Low	Ethiopia	4	Africa
Low	Uganda	4	Africa

Despite the tremendous growth, mobile payment does come with issues (Dennehy & Sammon, 2015). The major problem seen now days is fraud. For example, once money is sent out using a peer-to-peer app, it will be hard to get it back. Email scams, phishing messages, malicious QR codes, and many other kinds of virus are causing damages to unwary and inexperienced customers. It is reported that while mobile payments represent 14 percent of transactions among merchants who accept them, they constitute 21 percent of fraud cases, which amounts to \$6 billion a year (Kharif, 2015). For example, in China, about 13 percent of mobile payment users have suffered from telemarketing frauds and most of them could not get the lost money back.

As mobile payment is transforming from the stage of wild growth to the stage of consolidation, some policies are being developed to standardize hardware devices and transaction protocols (Pukkasenung & Chokngamwong, 2016; Duggal, 2013). One of such technical standard is ISO 12812 series. It is expected that a global standard could be developed by 2020. In the United States, although some laws are applicable to cover certain mobile payment issues, there is a lack of comprehensive and consistent laws at the federal level. Apparently, the policy making is lagged behind the technology evolution. To maintain a healthy mobile payment development, the governments should spend more effort in regulating mobile payment industry and mobile payment practices.

Social Inclusion

Technology, in general, is related to social inequality (Arocena & Senker, 2003; Dahlberg et al., 2008). For example, as labor-saving technologies are replacing human workers, the unemployment rate could increase while the producer's profit could increase. On the other side, the cost of the product could be lowered due to technology revolution, which makes products more affordable to low-income consumers. Therefore, technology is a double-edged sword for social inclusion (Warschauer, 2004).

As an emerging technology, mobile payment and its relation to social inclusion is undefined yet. This will largely depend on government policies and international initiatives. To address this issue, technology inequality and social inequality are discussed below.

Technology Inequality

Mobile payment is a smartphone app. The usage of smartphones directly affects the adoption of mobile payments. Worldwide, the smartphone penetration rate varies dramatically from country to country. Table 6 shows the smartphone penetration rates in some developed countries and some developing countries. It can be seen that economic inequality resulted in technology inequality. Smartphones are more accessible and affordable for developed countries. For developing countries, such as those of Africa and South Asia, smartphones are still considered luxury electronics.

Figure 5 shows the percentage of mobile payment users over its population of different regions. Globally speaking, mobile payment usages is still low. Even in North America, less than 16% of its population are mobile payment users. In contrast, 72% of the consumers in the US have at least one credit card. Therefore, technology inequality is still a big hurdle for the wide adoption of mobile payment, even in developed countries.

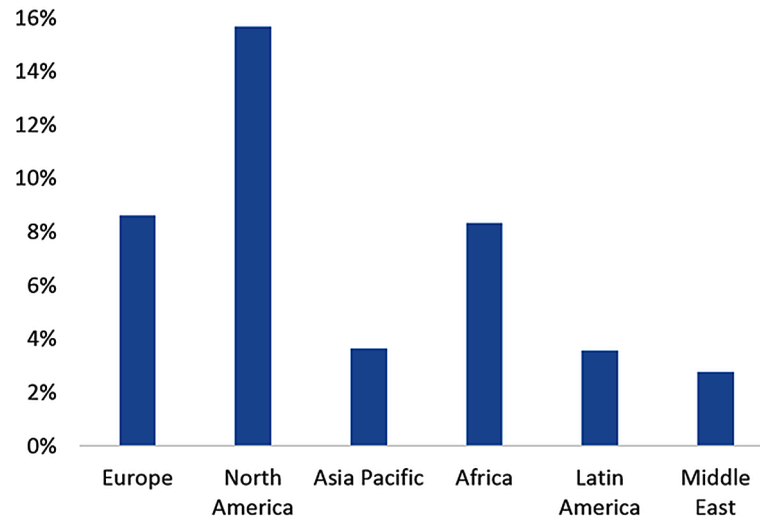
To reduce technology inequality, we should first wage a campaign to fight economic inequality. Economic inequality is the major barrier to improving social inclusion. This campaign should be the effort of the society as a whole. Second, low-cost smartphones targeting low-income consumers should

Mobile Payment and Its Social Impact

be promoted by IT industries, even that may lead to less profit. The corporates' social responsibility plays an important role in mitigating technology inequality. Meanwhile, governments should provide legislation support and tax benefits for those engaged corporations.

Figure 5. Percentage of mobile payment users over its population of different regions

Source: Statista, 2017c.



Social Inequality

As with any other technological innovations, mobile payment might affect social inequality both positively and negatively depending on the regulations. It is worth noting that many of the much-needed regulations have not been created yet.

Mobile payments are creating opportunities for small business, especially those in remoted areas of developing countries. Traditionally, large transactions, especially cross-border transactions are complex, expensive, and slow. Now days, with the support of mobile payments, small businesses are able to access funds and international markets easily. Especially, peer-to-peer payment is considered a convenient and low-cost cross-border transaction method. Therefore, we anticipate that more and more small business will switch to mobile payment. The landscape of international commerce, especially cross-border e-commerce, will be redefined. In this regard, mobile payment could help fight geographic inequality.

In addition, mobile payment could be extended to pay utility bills, hospital bills, tuitions, and miscellaneous fees. With its fast transaction, model payment could help low-income consumers avoid paying late fees. Mobile payment could also make it more convenient for elderly and disabled consumers to manage their bills. In this respect, mobile payment is considered a social-friendly technology.

Despite the potential positive impacts, there are also potential negative impacts. The winners of mobile payment revolution are no doubt these service providers, such as Apple, Google, PayPal, Samsung, Ant Financial, and Tencent. The losers could be banks, big and small. To contract these mobile payment providers to support their bankcards, the traditional financial institutions need to pay a portion of the transaction fees to the service providers. In this competing process, the technology is expected to win

and the traditional business is expected to lose. We will not be surprised to see business closed down and employees laid off. To avoid the worsening of economic inequality, this transition should be carried out smoothly to support workforce's retraining and reemployment.

In addition, governments should regulate mobile payment to avoid or limit its negative impacts. First, only zero or near zero additional fees are allowed to be collected from the mobile payment users. This is especially important for offline in store payment: just like payments made by cash or bankcard, no service fee should be charged to the consumer for mobile payment. For online transactions, mobile payment should incur no more fees than its underlying transactions, such as bankcard payment or e-check payment.

Second, traditional payment methods should also be supported wherever mobile payment is made available. Consumers should always be allowed to use cash and major credit cards. If a vender only accepts mobile payment, it will be detrimental to technology-disadvantaged groups, which can deteriorate social inclusion. Although no federal laws in the US mandating that a private business must accept paper currency for goods or services, some state laws consider refusing to accept cash illegal. For example, in Massachusetts, a state law affirms that no retailer shall discriminate against cash buyers. Similar laws should be passed to provide equal payment options for cash users, credit card users, and mobile users.

To summarize, a healthy business environment should address diverse interests of diverse social groups, especially those low-income groups and knowledge-disadvantaged or technology-disadvantaged groups. Without addressing technology inequality and social inequality, mobile payment revolution could lead to deteriorated social inclusion. On the contrary, when the needs of these less-represented communities are carefully addressed, we not only can improve social relations, but also can create opportunities to grow our customer base and markets.

Future Trend

Looking forward, let us examine the three areas that mobile payment could play its role and make a significant impact: in-store payment, online payment, and peer-to-peer payment.

With the common usage of smartphones worldwide, it is expected that the long used physical currency, paper money, will be gradually replaced by electronic currency. Bankcards and mobile payments could coexist for a long period of time. It is estimated that in-store mobile payments could reach \$500 billion in the United States by 2020. The potential winners could be Apple Pay and Android Pay, because both of them support contactless NFC transactions. In China, the future could belong to Alipay and WeChat Pay. Nevertheless, it is safe to say that nobody is one hundred percent sure about the future.

For online shopping, mobile payments provide some, but not significant advantages over bankcards. However, to make the transactions more convenient, a QR code for an order could be generated on the seller's website during the checkout process and the buyers could scan the code and make the payment with their smartphones. This will save buyers' time from entering bankcard data. Due to the dominance of PayPal in e-commerce transactions, PayPal could still be the major online mobile payment method in the USA. In China and beyond, Alipay's influence could grow bigger.

Peer-to-peer payments could also be switched to mobile, which has seen in both China and the USA. In China, both Alipay and WeChat Pay support peer-to-peer payments seamlessly. In the USA, PayPal and Google Wallet are the most popular ones. However, this area of payment will be closely regulated and monitored. In the United States, greater than certain amount of peer-to-peer payment is required to be reported in the tax return. Internationally, precautions will be taken to prevent money laundry with peer-to-peer payment.

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The success of a mobile payment service will largely depend on two factors: user experience and security. On one side, making payment a seamless part of the consumer experience is the driving demand for business to switch to mobile payment (Zhou, 2014; Ahmad et al., 2016; Liébana-Cabanillas et al., 2014). Convenience is the characteristic catalyst for currency revolution, which is seen in the transition from precious metals to bank notes, from bank notes to bankcards, and from bankcards to mobile devices. As mobile devices are getting smaller, mobile payment could be conducted with wearable devices. Internet of Things (IoT) is expanding its applications to many domains, including banking industry. It is expected that mobile payment could be extended to remote gadgets, such as smart devices at homes, internet-connected automobiles, trains, and airplanes.

On the other side, security is always the primary concern when adopting a new payment method. For service providers, there are three security levels: data storage security, transaction protocol security, and user device security. Industrywide, these levels of security will be strengthened. For end users, the major security concerns are identity protection and fraud prevention. Therefore, educating customers and setting up fraud alert mechanisms are important steps in reducing fraudulent transactions, increasing customer satisfactions, and improving customer confidence.

CONCLUSION

This chapter described mobile payment, its underlying technologies, big players, status, and social impact. Technologies are changing the business models and the business landscape and redefining social relations. As a new offspring of the business and technology revolution, mobile payment is still in its early development age. Many things are going to change. It is important for business to take this great opportunity to revolutionize their payment systems, improve their customer relations, and redefine their market positions. It is equally important for governments and international organizations to actively support and regulate mobile payment to provide a healthy environment for its growth and to improve social inclusion.

Because mobile payment is relatively a new applied technology, its impact, especially social impact, is unknown yet. We are actively observing its effect and collecting related data now. The main purpose of this chapter is to discuss the potential impact of mobile payment on social inclusion and provide guidance and suggestions for stakeholders, such as governments. Meanwhile, this chapter intends to call the attentions of researchers on the far-reaching impacts of mobile payments.

When metal currencies were used thousands of years ago, few people could have pictured paper currencies, electronic currencies, or mobile payments. Same thing holds true now. The payment methods we are using today will certainly not be able to last another one thousand years or one hundred years. No one can predict the future; however, the future is shaped and influenced by our decisions today.

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Chapter 25

Analysis of a Mobile Payment Scenario: Key Issues and Perspectives

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ABSTRACT

The objective of this chapter is to evaluate the scenario in which mobile payments are currently inserted to offer those interested in developing research in this area a broader understanding of the mobile payment ecosystem and its evolution. A study by Dahlberg, Guo, and Ondrus revealed that researchers are focusing on the same topics (especially consumer adoption and technological aspects) with a limited accumulation of foreground. Therefore, it is believed that the limited scientific literature regarding the history of mobile payment and its development in recent years surely makes it difficult to generate research on other perspectives. In this way, this chapter presents the general scenario of financial technologies, explaining how these changes completely changed the global economic scenario and gave rise to innovations in financial solutions for companies and consumers. The authors conclude the article by giving some recommendations for the diffusion of this payment system and for future investigations of mobile payment systems.

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INTRODUCTION

The trend of mobile devices is global and irreversible. These devices are increasingly present in our lives and their adoption is growing faster than initially predicted. The development of the offer of these devices and the increase of their use has modified our routines. This trend has been determined in a very special way by the emergence and subsequent evolution of smartphones since they have the ability to add applications that are in constantly developing that solve operations that previously required a greater investment of time.

In this new era in which mobile devices become the center of daily activities, many existing services that were efficient before the existence of these new devices will end, as will all the profound changes affecting social customs (TicWeb, 2016). In the same manner, other services will spring forth and develop in an optimized and innovative way.

Following this trend, the mobile market in recent years has led lenders, banks and technology companies to orient themselves toward the mobile market for future payment solutions. Financial technologies are currently growing exponentially. The FinTech industry that brings together all the financial service companies using the latest technologies to offer innovative financial products and services currently generates millions of euros that directly influence the financial and technological industry. This importance and financial potential is one reason why the industry is able to change traditional business models in virtually all financial services and functions: banking, insurance, money transfers and payments, market provisioning, investment management, deposits and loans, obtaining capital, etc.

The FinTech industry has begun to have a significant effect on international ecosystems as it has had a major impact on the trends, on the flow of funds between market players, and on the attention of financial control agencies. The Financial Stability Board (FSB), an international body that monitors and makes recommendations on the global financial system, as well as other experts on the subject (Andresen, 2016, Mesropyan, 2016), believe that FinTech has become a vital element for international ecosystems, and will be a clear trend for the future.

In recent years, FinTech has grown and has gone from being a small-sized or figurative niche to becoming a global and relevant industry with impact (KPMG, 2017).

In light of the above, we can point out that the financial innovation generated by the growing use of new technologies is a factor of change in the financial system and inevitably, its importance will increase with the passage of time. Therefore, understanding these innovations is vital for a complete understanding of the structure and function of the financial system as well as the future commercial development of mobile payments.

In conjunction with the features mentioned above, these financial solutions open the doors to a multitude of possibilities for marketing if we consider the content they can generate. Information is, more than ever, fundamental and identifying the tastes and preferences of each customer's purchases allows the retailer to generate a more assertive message towards them, bringing the customer closer to the trade leading to results that are more efficient.

Hence, the implementation of mobile marketing can be a relevant strategic decision (Störm, Vendel & Bredican, 2014). The offer of services such as loyalty programs, coupons and product information, among others, can be important motivators in the process of adopting the FinTechs.

Although many experts claim that mass adoption of mobile payments is inevitable, many of the mobile payment solutions launched around the world in recent years are having a hard time consolidating. In this scenario, it is necessary to carry out more analysis on the mobile payment scenario and on the

adoption process of payment systems, as well as to monitor the effects that FinTech innovations have on the sale of products and services, in established financial institutions, in financial markets and in the global economy.

In this way, the main objective of this chapter is to offer a greater understanding on the current scenario of the mobile payments service. We believe that the results obtained from this work may offer a relevant knowledge to researchers and managers so that they can make better decisions both to investigate the adoption and to market financial technologies.

In the paper, we firstly introduce the scenario of financial technologies. Then, the section two explains how these changes have completely changed the global economic scenario, reviews the origin of the mobile payment and clarifies the different concepts involved in the term mobile payment. The section three expose the current scenario and possible future evolutions for mobile payments and finally, we conclude the chapter with the section four giving some recommendations.

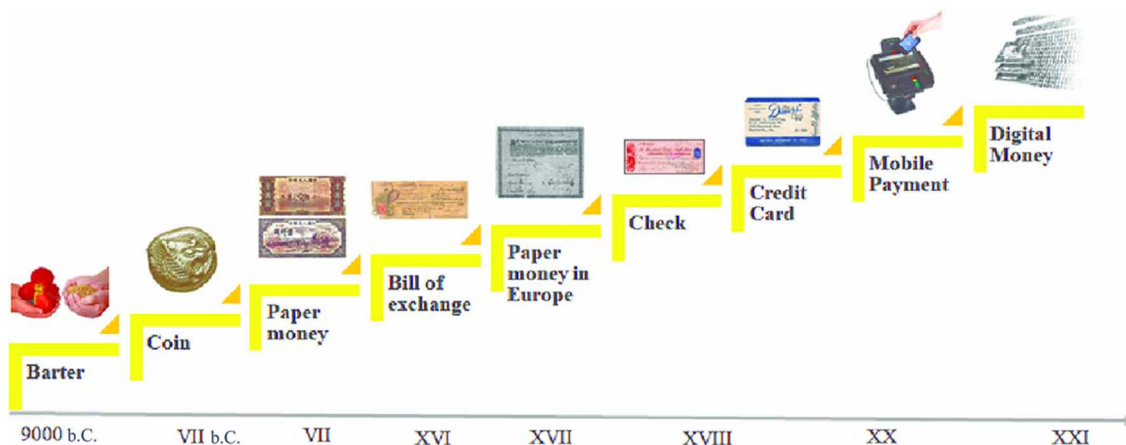
MOBILE PAYMENTS: PAST AND PRESENT

The Origin of Mobile Payments

To describe the emergence of mobile payment systems it is necessary to take a brief tour of the history of means of payment that is closely related to the progress of economic activity. Hence, advances in payment systems have historically favored economic development while, by contrast, a developed and modernized market demands a growth and modernization of payment systems. Summarized in Figure 1 are the main milestones in the evolution throughout history of the means of payment from the scheme of PwC & IE Business (2015).

Figure 1. The evolution of means of payment throughout history

Source: Author, from Romero & Ramos (1973), Kaynak et al., (1995), Dahlberg, et al. (2015), PwC & IE Business (2015), Bitcoin.org (2017).



Analysis of a Mobile Payment Scenario

Barter is the oldest known payment method, which gave way to trade in goods and laid the foundations for an incipient economic system. Barter has important drawbacks in particular that in order that the transaction take place, each of the parties had to desire what the other offered. In the first millennia of agricultural cultures, the most valuable commodities were salt, seeds, and shells. Subsequently, in the 7th century BC, coins began to be used. This rendered carrying out exchanges without bartering, and therefore with a sole bidder and client of a particular good or service. Coins were initially a mixture of gold and silver and began to be used in Lydia, a kingdom in today's Turkey, with King Croesus, renowned for his immense wealth.

Notes or paper money appeared for the first time in the 7th century AD in China in response to the growing demand of coins caused by economic growth that made transport of money increasingly dangerous and expensive. Hence, merchants began to revert to blank payment orders they could be collected in another city. As these documents became popular, they began to be printed as notes that later were issued on the emperor's own account, as noted in Marco Polo's 13th-century chronicles. It took several centuries for notes to reach Europe. The first western bank to issue state backed notes was the Swedish Riskbank in 1661.

Shortly afterwards, the 17th century saw the generalization in Europe of the promissory note, a document serving both as a means of payment and a tool of credit. Its negotiable character, recognized since the 16th century in Italy, and admitted little by little in other countries, was fundamental to mobilize the financial resources at the international level and to pay for the commercial revolution of the Renaissance and later centuries.

Another great breakthrough was the check, which completely changed the conception of the means of payment. Although its origin is not exactly known, there is evidence pointing to England in 1780 (Romero & Ramos, 1973). This means of payment introduces the element of trust in the transaction, as checks have no intrinsic value (such as coins of precious metals). They do represent a document, which merchants assume reception of the stipulated sum since a Banking institution participates as an intermediary to reimburse the merchant on behalf of the client.

After the check, the next technological and conceptual leap in the history of the means of payment was the appearance of the credit card. The first were issued in 1914 in the United States by Western Union. Later, there were other attempts, but the definitive recognition of plastic money came in 1950, when Diners Club launched a card that served for payments in stores and restaurants. Legend has it that the idea came when their founders were having dinner in a New York restaurant and realized they were not carrying money. True or false, it is certain is that this was the seed of the great consumption revolution in the United States in the 1950s and 1960s. The American Diner Club was followed by the very popular American Express launched in 1958 by Bank of America. During the 1960s and 1970s, Visa and MasterCard expanded their operations on a global scale (Kaynak, Kucukemiroglu & Ozmen, 1995).

Major changes took place in a short period during the 1990s. The emergence of the Internet and the development of electronic commerce represents a radical advance in payment habits allowing, for the first time, to carry out operations of all types from the living room of a house.

Credit cards, cash on delivery, and direct debits and transfers have served to make payments in electronic commerce from its inception to present times (Rodríguez-Martínez, 2015). Yet the task of maintaining the security of electronic transactions is a constant challenge as new attacks are constantly taking place. Because of the insecurity, traditional forms of payment were improved for electronic use while giving way to new ways of paying online. Consumers in this manner have the option to use both

online payment methods as well as mixed payments that can be carried out online and/or at the point of sale.

In 1998, Confinity saw the emergence of a financial platform designed to transfer money via PDAs (*personal digital assistant*) and was quickly oriented toward e-commerce payments. Three years later the company was renamed PayPal, its current name. Its success has been overwhelming, especially in the early 2000s. In 2002 eBay bought PayPal for \$ 1.500 million, at a time when the system already represented 50% of the payments of the portal. At that time PayPal was the payment method serving more than 100 thousand users (Inversian, 2016).

Currently, PayPal allows users make payments without charge over the Internet from a computer or from a mobile phone. It has become one of the major networks of global payments for auction websites and increasingly serves for the sale of goods, services, travel, digital content, as well as other professionals operating outside the Internet, including lawyers, contractors and doctors. These professionals have also begun to receive more and more payments on the Internet through PayPal (2017). The company currently counts about 152 million active accounts and is present in more than 203 markets worldwide. With the advent of mobile technology, it has boosted its service reaching a level of transactions beyond \$27.000 million (Inversian, 2016).

Since the inception of PayPal in 1998 and the start of micropatronage or *crowdfunding* at about the same time, there has been an explosion of creativity and entrepreneurship in the technology sector related to finance (BBVA Innovation Center, 2015). Companies outside to the traditional financial sector, began to use technology to propose innovative solutions that not only offer services traditionally associated with financial institutions, but also seek to improve them from a perspective focused on user experience.

Even if the notion is held that mobile payments are a new payment solution, this is not exactly the case in the technology market. Efforts to start a means paying with a mobile as a tool also began in this period. This began specifically in 1997 in Finland with Coca Cola experimenting for the first time in the world a mobile payment system allowing the purchase of soft drinks in a vending machine processing the sale by means of SMS (Dahlberg, Guo & Ondrus, 2015).

Mobile payment services in the 2000s became a trend in the business world even after the advent of the Internet and its great success (Dahlberg, Mallat, Ondrus & Zmijewska, 2008). Hundreds of mobile payment services were introduced around the world, especially in the form of experiments. These included electronic payments and access to Internet banking. Surprisingly, many of these efforts failed, and few have survived the passage weather.

Among the different solutions that has emerged during this period was Google Wallet, one of the first companies to mention the term “virtual wallet” for payment online or in physical store using the mobile. Launched in 2011 and still active today, especially in the United States, it stands out because it allows the consumer to pay with the mobile by simply approaching the device to the store’s sales terminal.

As can noted in some of the antecedents of the current means of payment, new technique such as mobile payments are not only the result of the constant progress of information, communication and economic technologies, but also stem from certain problems associated with the management of cash. These include: (1) the need to lower the cost of money and existing means of payment; (2) to give flexibility to small purchases and existing means of payments; (3) increase protection and security against fraud and other forms of crime; and (4) increase the pressure of the financial sector by new regulations that oblige them to seek more profitable ways of managing their business (Tamayo, 1999; BBVA Innovation Center, 2015).

Analysis of a Mobile Payment Scenario

As smartphones have an increasing presence in the lives of consumers, and the technological innovations of these devices do not cease, efforts in the last two decades continuously attempt to generate effective and secure mobile payments.

Technology and financial companies have therefore invested in the development of technologies to transmit payment data securely from the mobile payment device to the commercial point of sale (POS). Some forms of mobile communication to POS that have emerged include *Magnetic Secure Transmission* (MST), *Near Field Communication* (NFC), *Quick Recognition* (QR) Code, Bluetooth, Bluetooth Low Energy (BLE) and short message service (SMS) (ENISA, 2016).

During the last decade, new methods of payment have been launched to optimize the online or physical payment process. According to Rodríguez-Martínez (2015) these innovations include:

- Virtual cards, also called “single use credit cards,” designed to perform a single online transaction without issuing a physical card (BBVA, 2015);
- The contactless cards, which allow payment by approaching the card to the POS terminal of a business using NFC technology;
- Store payment applications owned by certain businesses with the aim to streamline the process of booking or purchase to increase efficiency in running their businesses.
- Mobile payments, which have gained new and important technological participants in the market development mobile payments such as, for example, Samsung with the Samsung Pay, and Apple with Apple Pay.

The last major milestone in the evolution of means of payment occurred in 2008 with the creation of the Bitcoin digital currency, the first use of a concept known as “crypto-currency” (Nakamoto, 2008). This was first described in 1998 by Wei Dai on the e-mail list “cypherpunks” proposing the idea of a new type of money that would use cryptography to control its creation and transactions, instead of a centralized authority (Bitcoin.org, 2017).

According to Houben and Snyers (2018) the European Central Bank (ECB) has classified cryptocurrencies as a subset of virtual currencies and defined such currencies as a form of unregulated digital money, usually issued and controlled by its developers, and used and accepted among the members of a specific virtual community.¹

It further clarified that three types of virtual currencies can be distinguished depending on the interaction with traditional currencies and the real economy:

1. Virtual currencies that can only be used in a closed virtual system, usually in online games (e.g. World of Warcraft Gold);
2. Virtual currencies that are unilaterally linked to the real economy: a conversion rate exists to purchase the currency (with traditional money) and the purchased currency can subsequently be used to buy virtual goods and services (and exceptionally also to buy real goods and services) (e.g. Facebook Credits);
3. Virtual currencies that are bilaterally linked to the real economy: there are conversion rates both for purchasing virtual currency as for selling such currency; the purchased currency can be used to buy both virtual as real goods and services.

So, cryptocurrencies, such as Bitcoin, are virtual currencies of the latter type: they can both be bought with traditional money as sold against traditional money, and they can be used to buy both digital and real goods and services (Houben & Snyers, 2018).

Therefore, virtual currencies are digital representations of value, not issued by a central bank, credit institution or e-money institution, which in some circumstances can be used as an alternative to money constituting a decentralized bi-directional (i.e. bilateral) virtual currency.²

The first specification of the Bitcoin protocol and the proof of concept was published by Satoshi Nakamoto in 2008 in an article in *Cryptography Mailing List* (metzdowd.com). In late 2010, Satoshi left the project without revealing much about himself (Bitcoin.org, 2017). Bitcoin has become a worldwide phenomenon, encouraging the creation of new currencies based on the same technology, the community has grown exponentially and has numerous developers working on the Bitcoin protocol (de la Horra, de la Fuente, Perote, 2019).

Currently, there are approximately 24 million bitcoin wallet addresses in total. This doesn't mean there are 24 million Bitcoin users because one person can have more than one wallet address and it is recommended to generate a new bitcoin address for each transaction sent (McCann, 2018). McCann (2018) consider 24 million the upper bound number on the number of bitcoin users worldwide.

Even though an increasing number of multinational corporations accept Bitcoin payments, Bitcoin is not universally accepted as a medium of exchange (Chokun, 2018). However, Bitcoin and other new currencies based on the same technology can be considered a mode of payment in ascension as McCann (2018) points out.

The Bitcoin protocol and its software are published openly and any programmer anywhere in the world can review it or develop their own modified version of the software. However, this is no longer history. It is the present and future of means of payment.

Classification of Mobile Payments

For the purposes of this study, mobile payment is defined as a “type of financial process of a private or business nature, in which an electronic mobile communication device is used to initiate, authorize and carry out a financial transaction” (Pousttchi, 2008; Liébana-Cabanillas, Muñoz-Leiva & Sánchez-Fernández, 2015).

The current mobile payment solutions are based on the technological development of smartphones that allow development of payment applications that can be used in various ways during payment transactions. Surprisingly, there is a lot of misinformation about what mobile payments generating confusion when it comes to differentiating them. Wester (2011) classifies mobile payment systems into five main categories (see Table 1).

Table 1. Categories of mobile payments

Mobile in the point of sale	Mobile as the point of sale	Mobile payment platform	Direct carrier billing	Closed loop Mobile payment
Mobile Wallet	The smartphone as a cash register	The everything else mobile payments	“Put it on my bill”	The return of store credit card

Source: Author, from Wester (2011)

Analysis of a Mobile Payment Scenario

The mobile payments at the point of sale is known as mobile wallets, the purest type of mobile payment. The form takes place when a mobile phone carries out a payment at a point of sale when acquiring a product or service. This type of payment can revert to various technologies such as NFC, QR codes or other similar “*tap and go*” technology. In addition, these methods do not necessarily include only payment actions as they can carry out other functions and services.

A mobile as a point of sale is also considered a type of mobile payment when the smartphone functions as a cash register. In this case, merchants use a mobile device to process payments that customers make with credit cards, a method that should not be confused with mobile wallets.

Mobile payment platforms include all other types of payments using mobile device. In other words, any method allows consumers to send money to traders, or even to each other (sometimes called P2P).

A purchase with direct billing of the mobile operator adds the price of the product or service to the monthly telephone bill. Usually it serves to purchase digital content such as games, apps, etc. This type of payment is growing in recent years.

Finally, *closed loop* payments are mobile applications developed specifically for a store or brand that works not only as a payment option at this store, but also includes additional services related to payment, such as notice of promotions, loyalty programs, discount coupons, etc. This technology is considered a new channel of relationship with the customer using a mobile platform that integrates both the payment at the point of sale and other mobile marketing services. An example of this service launched by Starbucks saw 3 million transactions in its first two months. The main characteristic of this payment category that differentiate it from others is that a consumer can only use it in a particular store and not in several, as is the case of the previous examples.

The Current Standing of Mobile Payments

Cash is still the most common means of payment in the world. According to G4S Cash Solution (2018), demand for cash continues to rise globally, despite the increase in electronic payment options, including mobile in recent years. Cash in circulation relative to GDP has increased to 9.6% across all continents, up from 8.1% in 2011. Cash remains attractive because it provides many benefits to the payer, including anonymity and gratuity. Yet it serves mainly for low value transactions, cultural habits and outdated payment infrastructures continue to contribute to its use (Capgemini & BNP Paribas, 2016).

However, the durability of cash payments is not tantamount to a stationary market. Firstly, carrying around large amounts of money can be physically challenging and is not always safe. Secondly, printing, moving, and handling money is costly. The cost of cash across a typical retail value chain - including the government, banks, merchants, and consumers - is approximately 13.2% of the total value of the physical currency on average. For governments, this cost includes printing money, distributing it and replacing it. To manage physical currency, banks need vaults, teller windows, ATMs, and all the related expenses. Merchants incur security, transport costs and potential lost interest when money is not in the bank. For the end consumer, physical cash can be stolen or lost. Finally, cash is often impractical for both large value transactions and transactions across distances, again, because of the challenge of moving significant sums of physical currency (Kapronasia & Finastra, 2018).

Although cash is nearly universally accepted, these challenges prompted economies to develop other alternatives as the mobile payments. Among the new means of electronic payments are mobile payments, which have begun to appear among the statistics of different means currently existing payments.

In Kenya more than 22 million people are registered to pay for purchases and supplies with mobiles (Communications Authority of Kenya - CAK, 2015) as clients of M-Pesa, a subsidiary of Vodafone or through SMS as most of the population does not have a smartphone or internet connection. However, although similar initiatives to those of Kenya has been implemented in neighboring countries, they have not, by far, met the same success (Uwamariya, Michalik, & Loebbecke, 2016).

The US mobile payments market is significant, but has been relatively slow to adopt mobile payments compared with other markets like China. EMarketer (2018) forecast that 61.6 million people in the US will use mobile payments in 2019, more than 20% of the population, while in China, it is expected that 577.4 millions of people in the country will use mobile payments, more than 45% of the population. On the other hand, a growing number of retailers and restaurants are accepting mobile payments in the country. Earlier 2018, Apple announced that half of all retailers in the US now accept Apple Pay, up from just 3% when it first launched in 2014 (eMarketer, 2018). In addition, according to research from eMarketer (2019) the Starbucks app was the most popular mobile payments platform in the US in 2018. With 23.4 million users, Starbucks beats second-placed Apple Pay (22 million) and the coffee giant is expected to maintain its lead into 2022

In Europe, the payment landscape is evolving. Spain is among the first countries to introduce instant and person-to-person mobile payments. 27 Spanish banks have teamed up to launch a new mobile payment platform called Bizum. This platform is designed to further develop the electronic payments market in Spain (G4S Cash Solution, 2018). In Germany, the cash culture is holding back mobile payments adoption especially because many people do not see any significant benefit to changing their habits. However, Emarketer (2018) expects 6.9 million people in the country will use proximity mobile payments (which include mobile payments) in 2019, more than 8.0% of the population. In the United Kingdom, the scenario is not much more advanced as in Germany. EMarketer (2018) expects only 7.2 million people in the country will use mobile payments, more than 13.0% of the population.

According PwC & IE Business (2015) while traditional methods of payments predominate, individuals, particularly younger consumers, are beginning to introduce the most innovative payment methods on a daily basis. The study also shows that the future evolution of mobile payment systems will be conditioned by two major cross-cutting elements: security and regulation.

Security is an important factor since no new means of payment can prosper if the user is not convinced that his/her money is not in danger. Regulation, meanwhile, faces problems to unify due to its great impact on business models, its development in different levels (sectors, channels, products, etc.) and its geographic fragmentation.

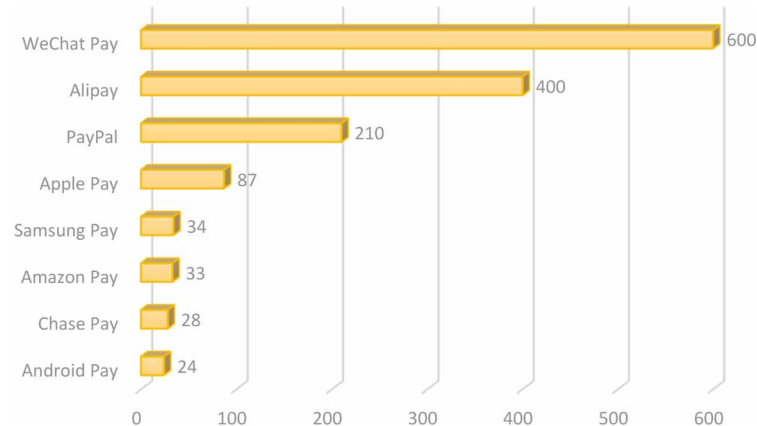
In the last years, three major technology companies made efforts to promote their mobile payment solutions on the market and achieved a significant response from the industry. In 2014, Apple launched their first mobile wallet app (Apple Pay), followed by Samsung (Samsung Pay) and Google (Android Pay) a year later. By 2022, it's estimated that the transaction value of mobile payment apps will reach nearly \$14 trillion illustrating the fast-pace of the worldwide industry (Rolfe, 2018).

These events have served as an important means for the adoption of mobile payments worldwide. Users have shown an increased interest in mobile payments (or at least better knowledge of them) after these three companies submitted their payment systems. Apple Pay is estimated to have 87 million users worldwide, Samsung Pay is available in 24 markets, including the latest market, South Africa, is estimated to have 34 million users worldwide and recently passed more than 1.3 billion transactions globally (Samsung Newsroom, 2018), and Android Pay is the mobile payment that is experiencing the lowest growth of the major ones that are in the market, with 24 million users worldwide (Merchant Machine, 2018).

Analysis of a Mobile Payment Scenario

In addition to these three mobile payment tools, other solutions also deserve special attention because of their significant market share (see Figure 2).

Figure 2. Number of users of leading mobile payment platforms worldwide (users in millions)
Source: Merchant Machine (2018)



According to Statista (2018) as of 2017, a third of internet users worldwide has used a mobile payment service in the last month, with the highest usage rates occurring in China and India. Europe was ranked last with a 22 percent mobile payment usage rate. Due to this above-average use of mobile payments in China, it is to be expected that the biggest online payment platforms worldwide are Chinese: WeChat Pay and Alipay with 600 million and 400 million users respectively as showed in Figure 2.

When talking about mobile payments, it is inevitable to talk about WeChat and Alipay because, precisely because of the great success of these platforms, China leads an overall increase in mobile payments. According to Kapronasia and Finastra (2018), China's mobile payment market is expected to grow at a CAGR of 35.1% from 2016 to 2022, as compared to 33.4% globally.

Although this trend started in Asia, the international reach of the China's tech giants like Ant Financial continues to grow, challenging incumbents in Europe and the US who must innovate to stay competitive. Alibaba's recent acquisition of 33% of Ant Financial is a further indicator of the company's international ambitions (Kapronasia & Finastra, 2018).

The potential of mobile payments has also been perceived by banks around the world, which are likewise joining forces to promote the service. According to Schafer (2016), at the end of 2014 there were only seven banks that supported mobile payments, whereas by the end of 2015, 55 banks worldwide offered or were starting to offer them.

The process of adopting mobile payments has been slow. However, the development and new applicability of technologies can be a strong ally in this process. An example of this is the "wearable" technologies, which present great potential and have been gaining special attention by the technological sector in recent years. This technology is part of the great wave of "Internet of things" (IoT), a concept that refers to the digital interconnection of everyday objects through the Internet.

Wearable technology includes technological devices designed for use either as a part of their clothing or as complements such as glasses, watches, headphones and headsets, fitness and healthcare trackers,

and jewelry and fashion in general. A recent report by IDTechEx, Hayward, Chansin, and Zervos (2017) claims that the market will be worth more than \$30,000 million in 2016 and will grow in three stages: 10% annually over \$40,000 million in 2018, accelerating to 23% with more than \$100,000 million in 2023, and decelerate to 11% reaching more than \$150,000 million in 2026.

In the last couple of years, a multitude of wearables devices has been launched with the promise to change the way we perceive and interact with technology. The entities interested in promoting mobile payment have sought to unite the convenience of this technology with mobile payment systems by developing *wearable payments devices*.

In 2016, the digital security provider Gemalto announced that its contactless bracelet Celego to pay transport tickets, had won an award from Juniper Research. The bracelet was implemented in the Euro 2016 Football tournament in Lille, and the Saracens Rugby Club for fans to purchase food and beverages at the Allianz Park Club stadium (Gemalto, 2016a). The contactless wristbands company the same year also announced its collaboration with RioCard, an operator selling tickets for public transport in Rio de Janeiro (Gemalto, 2016b).

This means of payment allows micropayments by means of approaching a device to a contactless terminal by a simple wrist motion. The benefits are an increase in the speed of transactions and simplification of travel logistics, building a simple, convenient and secure base for contactless payments.

After the release of Apple's smart watch in 2014, the Apple Watch, many applications were created over two years to be used with it. The most relevant is perhaps Apple Pay which began to be marketed in 2015. Currently, payments with Apple watch through Apple Pay can be carried out in 13 countries: Australia, Canada, China, Spain, USA, France, Hong Kong, Japan, New Zealand, United Kingdom, Russia, Singapore and Switzerland (Apple, 2017).

Samsung has also entered into this dispute and has already allowed users of Android devices to pay with mobiles and the Samsung Gear S3 smart brand watch in Korea, USA, China, Spain, Singapore and Australia (Samsung, 2017; El Economista, 2016b).

Several other solutions were launched in the last year touching on the issue of wearables and mobile payments. Some, including those mentioned above, received increased attention in 2016 and 2017. Yet some companies have gone beyond smart watches and offer rather interesting payment solutions. Microsoft, for example, allows users of its physical activity monitor (Microsoft Band 2), to pay at Starbucks.

In the banking sector, Barclays is one of the most innovative in the field of *payments wearables devices*. It allows their clients, or clients of any other bank that owns the app payment BPAY, to pay for goods and services in the UK wearing a jacket of the Lyle & Scott brand or jewelry from Topshop equipped with a contactless chip integrated payment linked to the BPAY application (Barclaycard, 2016).

The Current Ecosystem of Mobile Payments

The changes taking place in the sector of means of payment are not only technological, economic or market oriented. They go further affecting the essence of the exchange. To fathom the mobile ecosystem, it is necessary to properly understand the business models used by financial institutions and other participants.

In the traditional financial products of the past, the market strategy was oriented toward the product. The client was another element in the flow of the transaction. Payments by card, transfer or by direct bank debit were regulated so that banks had a decisive role in all phases of the process. They were thus able to generate significant revenues for their participation.

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Thus, there was a clear hegemony of banks in the traditional system of means of payment (cash, checks, cards, transfers, etc.). However, with the passage of time new competitors have made an appearance confronting financial institutions in areas of traditional banking business. Currently, there are still areas of traditional business that are subject to dispute and a new territory of income, denoted “emerging digital” offering opportunities for all.

Constant changes in consumer preferences have been key to a more diversified scenario. With the passing of time, the consumer has access to increasingly diversified information that completely changes the decision making process. Thus, the new system allows multiple holes for disintermediation, opens the door to new competitors, provides opportunities to offer other services on an equal basis, lowers margins and ultimately suggests that business models will have to change in depth to adapt to the new realities of the sector (PwC & IE Business, 2015).

The emerging digital sector that offers new proposals that are revolutionizing the market deserves special attention because of its relevance and innovative participation in the scenario of payment. According to B.I. Intelligence (2016), “We’ve entered the most profound era of change for financial services companies since the 1970s brought us index mutual funds, discount brokers and ATMs” and that is the result of the rise of the emerging digital sector.

Within this segment are included all financial services accessed and carried out with a mobile phone, including mobile wallets and, of course, mobile payment both online and in a point of sale. The subsegment of mobile financial services, or mobile money, possess an own ecosystem as they include different services and require the collaboration of different actors. According to Shrier, Canale & Pentland (2016), this ecosystem has five main participants although not limited strictly to them:

- **Mobile Network Operators (MNO) and Communication Service Providers:** Offer communications service and infrastructure for operation. In some regions, where they are legally authorized, they enter the financial sector through the issuance of electronic money and the offer of payment services. In addition, some are serving as mobile strategy advisors for industries that are new in this field.
- **Banks and FinTech Companies:** create and offer banking services that are available for mobiles. The *startups* of FinTech have been able to move faster than traditional banks, but both entities are responsible for providing financial experience as well as support and promote new offers banking services.
- **Agents and Intermediaries:** These players are often the point of contact with the consumer, and usually are the face of the offer of mobile money. They mainly carry out the operational functions for the service such as opening accounts and transaction management.
- **Retailers and Employers:** They can make payments for business to consumer (B2C) transactions. This category may be broad ranging from shopping in stores to payments of public service bills, to paychecks, as well as B2B transactions.
- **Regulators:** They seek to provide a regulatory framework to protect individuals and provide stability to the financial system, while fostering a favorable environment for innovation. In this sense, telecommunications and financial regulators will have to cooperate.

The information exposed in this chapter leaves no doubt that it is essential to expand the mobile payment market to create a high degree of interconnectivity among those interested in promoting this service. Hence, it is important to involve a number of large and small diverse, traditional and novel,

global actors, as is the trend in recent years. However, consider that networks are also critical factors for the ecosystem component and that traditional lines of industry are increasingly blurred, particularly among mobile service providers and finance. It is thus possible to find both opportunities for new business models as unexpected competitive threats (Shrier, Canale & Pentland, 2016).

Moreover, mobile payments also have their own ecosystem, which of course can be very complex due to the interconnections of the above-mentioned participants as well as six others. The relations between the participants in the ecosystem of mobile payments play a key role in its development and operation. This occurs because it is an innovation that to be generated involves different skills and requires a long procedure to reach consumers as a safe and effective solution. Figure 3 summarizes the ecosystem englobing mobile payment and the key participants responsible for the daily use of this method of payment.

Figure 3. Mobile Payments Ecosystem

Source: Authors



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Despite the broad ecosystem where mobile payments are developed, this means of payment is in its infancy. The current scenario may appear to be quite developed, but can still change considerably and nobody knows how it will evolve in the medium term. This is particularly the case when we consider that new ways of conducting financial transactions and new types of money are emerging in the world. Right now, it is easy to imagine a future where we are all connected, with synchronized transactions, and hardly anyone using cash. However, finding ways to reach that reality can be a great challenge, especially when we understand that the scenario in which mobile payment is developed is somewhat delicate, and possibly, for these reasons, mobile payment is still not a massive payment tool.

The Regulation of Mobile Payment in Europe

As in other aspects of finances, regulation is a key factor in the development of the means of payment and can play a role in the viability of the different business models in different countries. So far, there is no specific regulation for mobile payments, but the legislative powers are beginning to move in that direction.

The first *Payment Service Directive* (PSD 2007/64/EC), implemented in 2009, aimed to create a single payment market for the European Union and thus promote innovation, competition and efficiency within the Community. The PSD remains in effect and has allowed to resolve the difficulty and rising costs of cross-border operations when each State of the European Union has its own rules, stimulating competition among the providers of services.

Subsequently, due to the constant technological advances, it was necessary to revise previous legislation and on the 8th of October 2015 the European Parliament approved the proposal from the European Commission to create safer and more innovative payment methods. The Directive on Payment Services, PSD2 (European Commission, 2015) offers EU Member countries a 2-year deadline to implement the necessary changes to national laws to comply with the new rules.

This directive is part of a legislative package that included a regulation of multilateral interchange fees. The regulation and the second payment services directive was implemented in January 2018 and comprise the following major changes:

- Introduction of strict security requirements for the initiation and processing of electronic payments and the protection of consumer financial data
- Opening the EU payment market for companies offering consumer or business-oriented payment services based on the access to information about the payment account – the so called “payment initiation services providers” and “account information services providers”
- Enhancing consumers’ rights in numerous areas, including reducing the liability for non-authorized payments, introducing an unconditional (“no questions asked”) refund right for direct debits in euro; and
- Prohibition of surcharging (additional charges for the right to pay e.g. with a card) whether the payment instrument is used in shops or online.

The project to regulate the charges of rates card transactions (the commissions the merchant’s bank pays the buyer’s bank) sets a series of maxima of 0.3% of the value of the acquisition transactions with a credit card and 0.2% with a debit card. In the latter case, the member states may lower the ceiling and impose restrictions on commissions in absolute terms. The goal of placing a cap on interchange fees is

for this constraint to press downward on the commission charged by banks on the merchant (the so-called rate discount which is not regulated), which in turn could benefit the final consumer. The European Commission expects the reduction in commissions to save 6,000 million Euros annually for the European payment system (PwC & IE Business, 2015).

THE FUTURE OF MOBILE PAYMENTS MARKET

The Role of Blockchain and Cryptocurrencies in the Evolution of Mobile Payment

Many technological advances meet the different needs of the market that took part in a great number of experiments carried out with mobile payments since 1997.

Among these solutions, the most recent is blockchain (also called chain of blocks) which promise to make most financial processes democratic, secure, transparent and efficient. Ibáñez-Jiménez (2016, p. 1) explains that blockchain “... is basically based on integrating computer files, related through matrices by identifiers or codes (e.g. alphanumeric) as combinations generated with algorithms, in multiple computers and identical in all. Therefore, when a sufficient number of users participates in the system, it allows a perfect, irreversible and synchronous identification of the content embedded in the files.”

According to Shrier *et al.* (2016), blockchain is a technological innovation that allows transparent interaction of the parts in a more reliable and secure network. It distributes access to data and has the potential to change not only the financial sector, but also many others, including health, logistics and real estate. Indeed, blockchain startups managed to raise \$5.6 billion in 2017 alone (Cooper, 2018) and the investments in blockchain and cryptocurrency stayed steady at \$4.5 billion in 2018 (KPMG, 2019).

In principle, the technology was created to manage the Bitcoin cryptocurrency, Yet Blockchain technology, in other areas of economic activity, can offer various advantages that, in the eyes of some entrepreneurs, investors, international organizations and governments, can revolutionize the global financial system. Table 2 depicts the main benefits of the blockchain technology, which is likely to be fully integrated into mobile payments in the future.

Table 2. Benefits of the Blockchain technology for the financial industry

Disintermediation	The transactions are carried out without a third party intermediary, which reduces or even eliminates counterparty risk
Users enabled	Users have control of all their information and transactions
High quality data	Blockchain data is complete, consistent, timely accurate and widely available.
Durability, reliability and longevity	Due to decentralized networks, there is no single weak point and is better able to withstand malicious attacks
Transparency and immutability	Public transactions are visible to all parties which creates transparency, and all transactions are immutable
Simplification of Ecosystems	All transactions are added to a single public accounting book, which reduces the clutter and complications of multiple ledgers.
Faster Transactions	Reduce transfer time and other transactions to minutes and process 24/7
Lower Transaction costs	By eliminating intermediaries and overhead for asset swaps, blockchain has the potential to greatly reduce transactions fees.
Source: Author, from Deloit (2016)	

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The attention currently paid to blockchain can be compared to that of the inception of the Internet. This indicates that this is a new model based on decentralization, possibly breaking down borders as the Internet did. This is especially clear through its application to large number of processes: domestic payments, international payments, contracts, records check, etc. in short, any transaction is disruptible with blockchain-based applications.

The arrival of blockchain in recent years has offered the global financial services industry an additional energy to generate new financial services. Yet it is not only in this area of business that blockchain is gaining currency. The *Blockchain Capital* (formerly known as *Crypto Currency Partners*), for example, has managed to raise \$7 million for its second inversion fund for projects related to Bitcoin and blockchain specifically focused in cases of non-financial use (Rizzo, 2015).

Mesropyan (2017) identified 30 examples of use of blockchain technology for non-financial services. This was done by closely monitoring new companies that are already operational or in hidden mode. Examples include: the digitization of documents/contracts and proof of ownership for transfer (Colu); proof Authorship and ownership of digital content (Bitproof, Blockai, Stampery, Verisart, Monegraph, OriginalMy, Crypto-Copyright, Proof of Existence, Ascribe, Po.et); Birth and death certificates (Khanactions, LLC); Esports (FirstBlood); create value transfer points for ride-share (Arcade City, La'Zooz); traceability of food products and supply chain audit (Provenance); among others. In short, it is very possible that this new technology will be part of our daily life in a very short time.

In this way, and knowing its great potential for both financial services to non-financial, it is important to include this technology in this analysis because everything indicates that it will be an important step in the process of commercialization and adoption of mobile payments.

According to International Finance Corporation - IFC (2019) in the financial services sector blockchain initiatives fall under two main categories. The first is process efficiency rationale, which occurs in countries with established financial market leaders (typical in OECD countries). Blockchain projects in such cases focus on a gradual application of the technology, leveraging process efficiencies in existing business models and utilizing private or semi-private blockchains, either within their organization or through consortia such as R3, Hyperledger, and Digital Asset Holdings. And the second is new market creation rationale, in which new market players target the inefficiencies of existing business models to deliver value in emerging markets. These can be start-up businesses originating from advanced or from emerging market economies, or large non-financial players that see an opportunity in expanding the value chain of a current service. Global payments, or remittances, and digital wallets are examples.

According to Bank for International Settlements (2019) report, at least 40 central banks around the world are currently, or soon will be, researching and experimenting with central bank digital currency (CBDC). Countries like Uruguay, Sweden, China (Long, 2016), the United Kingdom (UK Government Office for Science, 2016), Japan (Rizzo, 2016), or even the Vatican (O'Ham, 2016) are exploring electronic versions of their own *criptoxicity* and legitimizing digital currencies by incorporating its existing regulatory framework. While the Eastern Caribbean Central Bank (ECCB) and the Barbados-based FinTech company, Bitt Inc. (Bitt) have signed a contract to conduct a blockchain-issued CBDC pilot within the Eastern Caribbean Currency Union (ECCU) (ECCB, 2019).

The corporations most interested in blockchain are banks and other financial institutions (International Finance Corporation – IFC, 2019). A study by the IBM Institute for Business Value (2016) between banks and global institutions reveals that commercial solutions for the financial area are rapidly being adopted by such organizations. In addition, the study showed that 65% of banks expect to have block-

chain solutions in production over the next three years, while 15% of banks and 14% of other types of financial institutions interviewed intend to implement them in 2017.

Proof of this trend is that in 2018, a strategic partnership between Ripple Labs and Santander Bank was initiated to develop a mobile application for cross-border payments based on blockchain with an investment of \$ 80 billion by Santander Bank (Young, 2018). This entity estimates that use of blockchain by banks can reduce infrastructure costs by up to 20,000 million dollars a year (Perez, 2015).

On the other hand, the Santander bank in collaboration with UBS, BNY Mellon, Deutsche Bank, market operator ICAP and startup Clearmatics have used blockchain technology in the project “Utility Settlement Coin” (USC) intended to investigate and promote the use of money digital between financial institutions and central banks (El Economista, 2016a).

Finally, Spanish banks have joined forces through the Society of Payment Procedures SL, affiliated by 27 banks operating in Spain. Its board of directors is composed of representatives of CaixaBank, BBVA, Banco Santander, Banco Sabadell, Bankia Banco Popular, Kutxabank and Unicaja. They therefore intend to jointly manage the Bizum payment platform, a system that will bring together the majority of entities in the country and standardize the banking transactions of companies and individuals reverting to blockchain technology. This is the first step in implementing a common platform with which operations can be carried out instantly and through all digital channels (Bronte, 2016).

The new scenario of the coming years will see major changes in the financial system and the way people conduct financial transactions. For mobile payments, this supposes a breakthrough since with this technology offers the possibility to add more value to the user with a unified system, as well as increase security and convenience during transactions. Although drawbacks will surely arise in this process, we may be at a road of no return, because, even if blockchain were not to work completely, other improved technology will most likely be developed to reach the objectives of decentralizing the system.

Mobile Payments Perspectives

As noted in the preceding paragraphs, the international scene of payments is changing rapidly and, although there is a long way to go to attain mass acceptance of mobile payments, daily use of these payment methods is very close.

This statement is true for several reasons. First, consumers are increasingly more demanding, which puts companies under pressure to evolve and improve their services if they want to conveniently serve the needs of its customers. On the other hand, the payment system itself has many advantages such as high mobility, ease of use, immediate character, optimization of buying and selling and process, greater security, comfort, possibility of integration with other services, etc.

In addition, through the use of mobile payments, retailers are put in a position where they can use the payment data to improve their assistance and information for their customers. This effect can be amplified by linking relevant services such as loyalty programs, personalized offers, purchases and orders, product comparisons and more (Mobgen, 2015).

To conclude, banks and credit card companies, entities that have never before had threats, are now subject to fierce competition from a new generation of digital service providers whose mobile banking solutions are often decentralized, much cheaper, more transparent and customer-oriented services used by their current customers.

The notions presented so far assume that integration of mobile payment solutions will suppose great value to retailers and consumers. At the same time, with all the potential for industry of mobile payments,

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its proper application implies for its participants in the ecosystem a successful formula, manifesting that this is the future means of global payment.

According to Bohnhoff (2017), the digital payments sector, with a global transaction value of around 2.221 million dollars in 2016, accounted by far for the largest share of the total FinTech market. When referring to digital payments we include digital commerce, mobile payments at the point of sale, and transfers between two individuals through any mobile device (P2P).

Overall industry digital payments are expected to double its transaction value in 2021 and reach 4,644 million. This is based on an expected mobile payments growth of more than 8 times between 2016 and 2021 at an annual growth rate of 52% (Bohnhoff, 2017). These forecasts explain why most service providers are engaged in this new market.

Specifically, in Europe, the progress of digital payments is moving slower than in other continents like America and Asia. Yet there is evidence that the scenario is evolving and a lot of progress in the field of mobile payments is expected in the coming years.

It is expected that the future will bring changes in digital commerce starting with the development of mobile wallets as PayPal, Apple Pay or Google Wallet and with new propositions of FinTech innovative solutions with more decentralized and accessible payment systems. It is also very possible that with time payments with credit cards will offer a less lucrative return for card networks, banks that issue cards and affiliated businesses.

On the other hand, one expects an immediate process of convergence and standardization of the means of payment ecosystem. The how and the when will depend on the needs and expectations of customers as well as the ability of companies in the sector to generate common solutions. In the process of union of the two interests, there are a number of trends, global, sectoral and technological influences. Their confluence depends on how the development of the landscape of the means of payment throughout the world will occur in the coming years (PwC & IE Business, 2015).

Global trends that will have the strongest impact in the coming years in payment systems are characteristic of contemporary society spanning all sectors and industries. In almost all of them, the catalyst is the Internet and digital technology, and the main effect is the increased power and influence of consumer decision. According to the PwC, some of the trends that will further enhance mobile payments in the coming years are the geolocation application, Big Data, Cloud computing, Blockchain, wearables and Internet of Things.

In addition, it is important to consider that users are changing and new generations of “digital natives” have more resources to quickly recognize the advantages (and disadvantages) of new technology, including technology related to payment systems (Goodrich & De Mooji, 2014). Therefore, the user has more and more power and becomes a prescriber of the products he/she uses or recommends, and can even generate viral content.

The use of social networks does not stop growing, and not only for the entertainment has it offered, but also for its offer of content that serves as a reference for the decision-making of numerous users in everyday life. According to Statista (2019) by 2017, the number of global social networking users was 2.46 billion and is expected to reach 3.02 billion by 2021. With over 1.86 billion monthly active users, social network Facebook is currently the market leader in terms of reach and scope, followed by Instagram with 1 billion monthly active users in June 2018, reported by the platform (Statista, 2019).

Moreover, social networks have a great potential to become a payment channel, especially between private individuals. Studies have been carried out on this subject, with evidence that social networks significantly affect the online and offline purchase decision process (Goodrich & De Mooji, 2014), the

process of adopting new technologies (Risselada, Verhoef, & Bijmolt, 2014) and, specifically, the adoption of mobile payments (Koenig-Lewis, Marquet, Palmer, & Zhao, 2015).

In line with the above, we can expect that the characteristics of payment gradually involve in all kinds of everyday objects. Almost all personal items, from cars to smart TVs, may participate in payment transactions. This will allow customers to pay even faster and more easily. Physical contact is not strictly necessary when money is exchanged digitally. Waiting times will be reduced to a minimum or completely eliminated. When leaving a parking lot, the length of stay will be registered automatically and payment will take place by nearing the phone to a reader/display to confirm the amount. This could be accomplished directly from the digital display inserted into the dashboard.

The protection of data and privacy, especially in the financial sector, must make significant progress in the coming years. The major current wager is on biometric methods to replace conventional authentication systems such as the PIN, passwords and cards to ensure a higher level of security. Applying of personal methods, including fingerprint, face and iris prints recognition, are the best known. There is even talk of more sophisticated authentication methods using highly individual physical characteristics such as heartbeat, vein structure and echoes of the skull that increasingly offer more security and are more resistant to attacks from hackers and other cybercriminals (Pritchard, 2015).

Regarding the question of whether mobile payment is truly the payment method of the future, we must answer no. Mobile payment is the payment method of the present. The work and research carried out seek to improve procedures and adapt to the constantly changing consumer needs and technological innovations. Mobile payment is a payment method that already exists and operates in many countries. Although its use is not yet comparable to cash, it has a strong potential to expand and will certainly increase its present in the daily lives of consumers.

CONCLUSION

Knowing the history, the current situation and the prospects for mobile payments are of fundamental importance for the development of more accurate research and investigating really important factors for the diffusion of this type of payment. Currently, a very small number of investigations present information about the ecosystem of mobile payments and their evolution, for this reason the main purpose of this chapter is to fill this gap.

We believe that this chapter should help researchers strengthen the theoretical base of mobile payments investigations as well as use multi-perspective and multi-level approaches to conduct their investigations and, more importantly, build more on results of the research carried out (Dahlberg *et al.*, 2015). Consider the points explored in this chapter, such as the current situation of the mobile payment ecosystem, regulations and the role of blockchain in payment systems are beneficial to understanding mobile payments in a more holistic way.

Although the first attempts to implement viable mobile payment services linking consumers and businesses (B2C) was initiated more than a decade ago, no payment solution developed so far has been particularly successful (Pousttchi, Schiessler & Dietmar, 2009). However, important advances in the last years have resulted in a more receptive market therefore raising the potential to spread application of this type of payment tool is now greater than in the past.

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Although cash remains central to the economy, cashless payment methods become more common with each year. Overwhelmingly, the rise of the cashless society is a good thing. It promises greater convenience, lower risk, and improvements in the state's ability to clamp down on practices such as tax avoidance and money laundering.

In the meantime, special attention must be given to the social impacts that these changes will have on that transition. What about micro-payments? And even more importantly, what happens to the estimated 40 million Europeans who are outside the banking mainstream? These are the EU's most vulnerable citizens and they have little or no access to digital payment methods (Araujo, 2019).

The contents of this chapter allows to highlight social concerns as stated above and should be extended to all players in the ecosystem of mobiles payments. It is important that these players work under proper planning transition to a future largely cashless, as that could generate the resurgence of financial exclusion, which we thought had been overcome in Western societies, or even develop isolated communities of unbanked, in which those shut out of the now almost entirely digitalized economy are left able to trade only with each other.

For these reasons and the other reasons stated previously in this chapter we recommend: First, that as industry and society, it is necessary to plan and work towards an inclusive cashless future—in which mobile e-wallets and other contactless forms of payment dominate: starting today. Because there is a lot at stake for many companies and some of the most vulnerable people in our society. Second, that future investigations and companies interested in spread the use of mobile payments, explore not only payments using smartphones, but also more innovative mobile payment devices such as wearables, those involving technology blockchain or that includes innovative aspects relevant to the adoption by the trades.

In this chapter, we provide a series of key information to better understand the mobile payments market by analyzing different aspects that help accelerate the process of mobile payments adoption and we hope our updated research and our recommendations provide useful guidance to the mobile payment research community and to raise the quality of research in this area in the future.

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Chapter 26

The Use of Technology Acceptance Model in Mobile Banking

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ABSTRACT

This chapter aims to determine the variables that explain using mobile banking. This study identifies and investigates the factors that influence the adoption of mobile banking, and specifically focuses on the evaluation of mobile banking application with users or non-users. The research model includes the basic concepts of the technology acceptance model. The technology acceptance model (TAM) tries to explain the adoption process and underlying influencing factors in technology acceptance. The survey was conducted to gather data which was coded in SPSS 17. Confirmatory factor analysis was used to analyze data, and structural equation modeling using Amos 17 software was used to validate the research model. The result shows that perceived ease of use, perceived usefulness, and perceived normative pressure significantly influences customer attitude, which affects the adoption of mobile banking.

INTRODUCTION

With the development of technology, as a result of the concept of mobile banking, bank users can easily perform banking transactions in anytime and anywhere. In recent years, many banks have been able to make mobile access transactions easily.

The developments in information technologies have continuously affected the banking sector. With the increasing use of mobile devices with internet access, banking applications have been moved to mobile platforms, and a new distribution channel has emerged in banking (pousttchi & schurig, 2004:1). With the spread of mobile devices, the utilization of mobile banking in the 2010'S began to rise rapidly. The ability to do so easily with mobile devices also increased the rate of use. The fact that mobile devices are easy to carry and size is smaller than other technological devices are other reasons that increase

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their usability. With the increase of the usage rate of mobile devices, the banking sector has started to offer applications for mobile applications. Mobile banking has started to develop in parallel with mobile software and has become very popular nowadays.

Mobile banking has become more effective as the internet becomes widespread. Mobile banking is the mobile branch that is entered via mobile phone by creating a security password that is connected by mobile phone. Mobile banking services in Turkey have services in the bank branch digital channels banking with only digital channels or with no branches systems. Mobile banking offers customers the privilege of being able to provide 24/7 service without having to be physically present at the branch for banking transactions and without depending on the bank opening hours. In this way, it gives its customers more advantage than the usual banking system to prefer mobile banking and remain as a permanent customer. In Turkey, 37 374 people now use mobile banking.

When domestic and foreign literature is examined, it is seen that there are few studies about mobile banking in Turkey. Chauhan (2012), McCloskey (2006) and Rogers (2003), Devadevan (2013), Zhou (2011), Malaquias and Hwang (2016) investigated the effect of trust on mobile use. Cheah, Teo, Sim, Oon, and Tan (2011), Dasgupta Paul and Fuloria (2011), Teo, Tan, Cheah, Ooi, and Yew (2012) examined the factors affecting mobile banking adoption. Bankole and Cloete (2011), Hanafizadeh, Behboudi, Koshksaray and Tabar (2014), Safeena, Date, Kammani and Hundewale, (2012), Jabri and Sohail (2012), Chaouali, Souiden and Ladhari (2017), Sharma, Govindaluri, Muharrami, and Tarhini (2017) in the studies, that have the purpose of determining the factors affecting the adoption of mobile banking in different countries. The study by Chen (2013), Z. Deng, S. Deng, and Zhang (2010), Huili and Chunfang (2011) found that the most important factor affecting the adoption of mobile banking is security.

The aim of the study by H. Çam and A. Çam (2016) is to determine the effect and relationship between financial behavior and attitudes and level of use of mobile banking applications. As a result of the analysis, it was determined that the most important factors affecting the decision of individual customers to use branchless banking services were reliability and competence. Ayhan Korkulu, Erkan Oktay and Yusuf Akan (2018) is to determine factors that may have an impact on the demand of mobile banking use, possible issues of mobile banking raised by customers and the reason of not using mobile banking for non-users as mobile banking seems to be significant advantages for both customers and banks.

As far as the studies no study has been found in which mobile banking is explained by technology of acceptance model. This research, we will investigate the adoption of Mobile Banking as a new technology by using the technology acceptance model (TAM) that a well-known model of information technology-adoption and use. Structural equation model (SEM) will be used introduced to explain the causality of the proposed model.

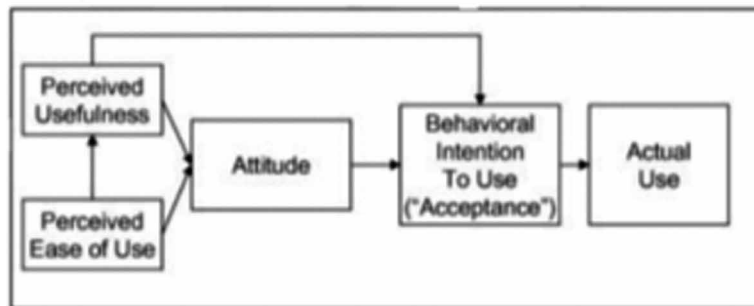
BACKGROUND

Technology of Acceptance Model

Davis et al.'s (1989) Technology of Acceptance Model (TAM) is one of the most popular approaches that have been used in this stream of research to explain factors affecting usage intention of a technology (Mortimer et al., 2015). The background behind the origin of this model is based on in order to increase the usage level of a new technology the first step is to increase the acceptance level which would be achieved by understanding what individuals expect from a technology to use it and inclusion of these

expectations to the system (Holden and Karsh, 2010). The simple, or early, form of TAM presented only three factors to explain acceptance of a new technology namely perceived usefulness, perceived ease of use and attitude towards using the technology (holden and karsh, 2010). In this model, perceived usefulness has a direct and indirect effect on acceptance where it is influenced by perceived ease of use. Perceived ease of use, on the other hand, is claimed have an indirect impact on behavioral intention through attitude. While the biggest advantage of TAM is having a solid explanatory power of the variance, the biggest disadvantage, on the other hand, is that, it does not include any factors related to subjective norms (Mortimer et al., 2015). The early form of TAM is provided in figure 1.

Figure 1. Technology acceptance model



TAM has been used in many studies, for example, it was employed to study user acceptance of micro-computers (Igarria et al., 1996), the World Wide Web, software and decision support systems (Morris & Dillon, 1997), and many other studies.

RESEARCH MODEL AND HYPOTHESES

This research adopts the Technology Acceptance Model (TAM). TAM is chosen as the appropriate model because of its flexibility; it has been widely used in other researches to predict user acceptance and use of technology. Based on the information systems acceptance literature, especially the extended TAM by Luarn & Lin (2004).

Research hypotheses based on the above research model is mentioned below.

Hypotheses 1: User's attitude to using Mobile Banking has a significant effect on behavioral intention to Mobile Banking adoption.

Hypotheses 2: Perceived usefulness has a significant effect on attitude to use Mobile Banking.

Hypotheses 3a: Perceived usefulness has a significant effect on perceived ease of use of Mobile Banking.

Hypotheses 3b: Perceived ease of use has a significant effect on attitude to use Mobile Banking

Hypotheses 4: Perceived Normative Pressure will positively influence attitude to use Mobile Banking.

Hypotheses 5a: Self-efficacy has a positive influence on the behavioral attitude to adopt Mobile Banking.

Hypotheses 5b: Self-efficacy positively influences the perceived ease of use of Mobile Banking in

RESEARCH METHOD

Measurement

Based on the relevant literature, a questionnaire was used to perform the research. The first part of the questionnaire consists of demographic questions and the second part consists of TAM scale questions developed by Luarn & Lin(2004). The scale of items was measured on a five-point Likert scale, ranging from strongly disagree (1) until 5 as strongly agree.

Table 1. Survey items used in the study

Variable	Item	
Perceived Ease of Use	PeoU1	Learning to use M- Banking services is easy for me
	PeoU2	It is easy to access the M- Banking application on my phone and make a transaction.
	PeoU3	Using M- Banking takes less time.
	PeoU4	Using M- Banking is less frustrating. It is easy to remember the access code to do further banking transaction each time.
Perceived Usefulness	PU1	Using M- Banking make me a modern customer
	PU2	Using M- Banking make my transaction easier
Self Efficacy	SE1	When I hear about new mobile technology, I look for possibilities to experiment it.
	SE2	I am usually fast to try new information technology on Mobile services
	SE3	I use M- Banking because I have seen someone else using it.
	SE4	I use M- Banking because someone has shown me how to do it.
Perceived Normative Pressure	PNP1	Most people who are important to me think I should use M- Banking.
	PNP2	People important to me think that I should use M- Banking
	PNP3	My peers think I should use M- Banking.
	PNP4	It is expected people like me use M- Banking services
	PNP5	People I look up expect me to use M-Banking
	AT1	My attitude towards M-Banking services is favorable
	AT2	I think that using M-Banking services is beneficial to me
	AT3	I like the idea of using M-Banking services
Adoption	AT4	Using the M-Banking services would be pleasant
	A1	I will frequently use M-Banking services in the future
	A2	I will strongly recommend others to use M-Banking services

In this study, a survey is used as a data collection method. Data collection was done among university students. The questionnaire was distributed to 360 university students. Data cleaning were performed, and 15 questionnaires were discarded due to incompleteness or having only one type of answer selection. Total of 345 questionnaires was used for further data analysis. In this research, the structural equation model (SEM) was used. SPSS 17.0 and AMOS 17.0 package programs were used for analyzing research data.

Table 2. Demographics of Participants

	N	%
Age Groups		
18-27	345	100,0
Gender		
Female	160	46,3
Male	184	53,7
Length of use of Mobile Banking		
less than 6 months	78	22,6
6 months- 1 year	124	35,9
1 year and above	143	41,5
	345	100,0

THE RESULTS

Measurement Model

To determine the variables included in the scale, explanatory factor analysis (EFA) was applied. Then the reliability of the variables in the scale (Cronbach's alpha) was tested, and then the confirmatory factor analysis (CFA) was applied to determine the construct validity of the scale. Latent variables in EFA can be controlled by many other factors used to summarize and minimize data. Kaiser–Mayer–Olkin (KMO) sample adequacy test value was found as 0,512 for factor analysis, and it was decided that the study was suitable for factor analysis. Factors analysis and the reduction of factors using the varimax Factors with factor loads above 0.50 were selected rotation technique was then achieved. According to the results of the analysis, 6 factors and 21 variables explaining 78,234% of the total variance whose eigen values were above 1 were obtained. The Cronbach's alpha reliability test was then included in the analysis whether the alpha coefficient was over 0.70. Table 1 shows the results of explanatory factor analysis. Alpha coefficients PeoU (0,86), PU(0,70), SE(0,75), PNF(0,83), AT(0,89) and A(0,71) were found and it was decided that the model is reliable because it is over 0,70.

The measurement model of the study was performed by using CFA by using AMOS program. Structural equation modeling (SEM) was employed to test the models in the present study. SEM is a multivariate strategy including measurement and structural models. Before the structural models are tested, the measurement model, which is a base for all the models, should provide an acceptable fit for the data (Anderson & Gerbing, 1998). Numerous goodness-of-fit indexes were used to evaluate the structural equation models and measurement models. First of all, the ratio between chi-square and its degree of freedom less than five is considered an acceptable fit, whereas less than two is a well fit to the data. Secondly, Goodness of Fit Index (GFI) and Comparative Fit Index (CFI) were used. CFI and GFI values between 0.90 and 0.95 were acceptable. Also, a value over .95 indicated a good fit. The Root Mean Square Error of Approximation (RMSEA) was another statistic, with values less than 0.08,

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Table 3. Alpha Value Questionnaire items

Variable	Item	Factor Loading	Composite Reliability
Perceived Ease of Use	PeoU1	0,885	0,86
	PeoU2	0,705	
	PeoU3	0,725	
	PeoU4	0,747	
Perceived Usefulness	PU1	0,70	0,70
	PU2	0,715	
Self Efficacy	SE1	0,786	0,75
	SE2	0,773	
	SE3	0,865	
	SE4	0,705	
Perceived Normative Pressure	PNP1	0,903	0,83
	PNP2	0,917	
	PNP3	0,765	
	PNP4	0,709	
	PNP5	0,754	
Attitude Toward	AT1	0,762	0,89
	AT2	0,809	
	AT3	0,789	
	AT4	0,820	
Adoption	A1	0,707	0,71
	A2	0,765	

indicating reasonable fit of the model to the data, whereas 0.05 indicated a good fit. The same criterion for reasonable fit is current for the other goodness of fit index called Standardized Root Mean Square (SRMR) (Hu & Bentler, 1999). The measurement model specified the posited relations of the observed variables to their underlying constructs, which were allowed to intercorrelate freely. Seven latent variables were used in the structural equation model testing: Perceived Ease of Use, Perceived Usefulness, Self Efficacy, Perceived Normative Pressure, and Attitude Towards, Adoption.

An initial test of the measurement model resulted in well fit to the data, $\chi^2/df=2,87$, RMSEA= 0.01, GFI=0.99, CFI=0.99, AGFI= 0,97 SRMR=0.045.

Testing the Model: Structural Equation Modeling Procedures

The structural equation model is reliable when the parameter values are estimated. The model must have sufficient sample size to be valid. In the literature, the sample size must be at least 100 or 10 times the number of variables in the normal distribution and 5 times the number of variables in the other distributions. (Jayaram, Kannan vd., 2004; Teo ve Choo, 2001; Jaafar ve Rafiq, 2005; Jackson, 2003; Karagöz ve Kösterelioğlu, 2008). The proposed research model incorporates aspects of the technology acceptance model and IS success model. The model presents 21 observed or exogenous variables (pse1, pse2, pse3, pse4, pnp1, pnp2, pnp3, pnp4, pnp5, peou1, peou2, peou3, peou4, pu1, pu2, ata2, ata3, ata4, ata5, ata1, ata2) and 3 unobserved, endogenous variables (peou, ata, a). Endogenous variables (or dependent variables), depend on other variables and have single-headed arrows pointing to them. Exogenous variables (or independent variables), do not depend on other variables and do not have single-headed arrows pointing to them (Arbuckle, 2005).

The goodness of fit sample (χ^2/df) and the goodness of fit indices (RMR, RMSEA, AGFI, TLI, GFI, NFI, IFI, CFI, RFI) were used in the study. All goodness of fit indexes are within the acceptance limits ($\chi^2=459.9$; $df=180$; $p=0.000$). Also have RMR (0,055) and RMSEA (0,041) values it is below 0,08 as

needed (Yen, Chin-Sen, et al., 2010; Yu, Ha, et al., 2005). In conclusion, the findings support the acceptability of the structural model.

SOLUTIONS AND RECOMMENDATIONS

This study aims to develop a structural model that describes and predicts the factors affecting mobile banking. For this purpose, 345 usable data were obtained and applied to university students. As a result of the model established with the variables explaining the attitudes towards adoption is predicted by perceived usefulness ($\beta = 0.06$), perceived ease of use ($\beta = 0.44$), perceived self efficacy ($\beta = 0.09$) and perceived normative pressure ($\beta = 0.20$).

These constructs were found to have a positive influence on the attitude towards the use of Mobile Banking. The findings confirm the positive impact of PEOU and PU, suggested by TAM. Similarly, PEOU and PU suggested by Luarn, and Lin (2004) is also stressed. This suggests that adoption of Mobile Banking is strongly determined by the attitude towards the adoption. This explains that Mobile Banking adoption is significantly influenced by social pressure; people will adopt Mobile Banking depending on social influence. Perceived Ease of use is explained by Perceived Usefulness ($\beta = 0.14$), and Perceived Self Efficacy ($\beta = 0.04$). Not all hypotheses were rejected.

FUTURE RESEARCH DIRECTIONS

There are some weaknesses of the study. Firstly, the study can be carried out not only by applying to university students but also by taking opinions of people from different sectors. Secondly, the study utilized a convenience sampling method. Young people were included in the study. Because we work with young people, the data is gathered more easily. Although the sample selected in this study is in good further studies are needed to confirm the causal relationships between the variables by using a large sample volume to increase the findings obtained as a result of the research. Also, demographic variables were not included in this study. Additional variables may be needed to increase the reliability of the model estimation. This can be an interesting challenge for the future researchers.

CONCLUSION

This study has important results in research on Mobile Banking. It has been concluded that the factors related to mobile banking have a significant effect on the decision making the process of individuals. The study validates the constructs perceived ease of use, perceived usefulness, and attitude proposed from research models by Davis (1989). Perceived credibility, perceived self-efficacy and perceived financial cost proposed by Luarn and Lin (2004) were also validate. For mobile banking users to use the application easily, mobile banks need to establish the necessary methods to increase their self-efficacy. Mobile banks are user-friendly, they can feel safe, and they need to give information about mobile banking.

From technology acceptance model, it has been found that perceived usefulness (pu) has positive influence on intention to adopt mobile banking apps in which means, the existing and potential customers of the mobile banking apps in turkey believe that the mobile banking apps will increase their job

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performance such as saving time for doing banking transaction. The result of perceived usefulness from this study also supports the previous study's results about internet banking as well mobile banking (Akturan & Tezcan, 2012, i. L. Wu & Chen, 2005, Safeena et al., 2013, Daud et al., 2011). Additionally, it has been obtained from the study that perceived ease of use has positive impact on perceived usefulness and trust to adopt mobile banking apps in Turkey, which means banking consumers in Turkey believe that using mobile banking apps would be free of effort. In other words, they perhaps believe that using mobile banking apps does not require technology know-how or effort for doing banking transaction through mobile banking apps. Thus, this perceived ease of use (peu) factor has impact on mobile banking apps adoption by both Turkish banking customers. This study shows the results obtained in support of TAM model. This study may lead to similar research.

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Chapter 27

Intention to Use Mobile Commerce: Evidence From Emerging Economies

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ABSTRACT

With mobile technologies' rapid development involving wireless networks and internet infrastructure, e-commerce has been evolving into a new, more significant phase: mobile commerce. Businesses throughout the world are highly motivated to invest in mobile commerce infrastructure and deploy their mobile commerce strategies as a source of sustainable competitive advantage to maintain existing and attract new customers. As probably the first systematic and comprehensive effort to date, this study analyzes the factors affecting customers' intention to use mobile commerce in Vietnam. The results show that perceived ease of use, perceived usefulness, variety of services, and trialability have both direct and indirect positive (via perceived usefulness) impacts on intention to use mobile commerce, while trust and social influence have indirect positive impacts on intention to use mobile commerce in Vietnam. Cost does not have any impact on intention to use mobile commerce in Vietnam. The results of this study are also compared with that of studies on mobile commerce conducted in China and Malaixia by Chong et al. Theoretical and practical implications, especially for helping businesses understand how to capture more customers in a rapidly developing country, Vietnam, are discussed.

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INTRODUCTION

E-commerce's emergence in the late 1990s revolutionized virtually all activities related to product/service and information exchanges in national economies (Pham et al., 2011). The core feature of e-commerce is that in a specific place, for example, at home or workplace, with just a desktop computer connected to the Internet, consumers can interact with websites of retailers or service providers to search for necessary information or purchase desired products or services (Yang et al., 2004). This is completely different from the traditional business environment where transactions and exchanges of products, services and information are conducted primarily via interactions between customers and the company's employees (Jun et al., 2004; Pham et al., 2018).

With mobile technologies' rapid development involving wireless networks and Internet infrastructure, e-commerce has been evolving into a new, more significant phase: mobile commerce (Gupta & Vyas, 2014; Zott & Amit, 2012). The unique feature of mobile commerce (m-commerce) is that customers are not limited by space and time. Using only a mobile device (for example, a smartphone or tablet) connected to the wireless Internet, consumers are able to search for relevant information or conduct transactions related to purchasing products or services at their leisure (Chong et al., 2012). As a result, mobile commerce worldwide is growing at a high rate and is projected to reach about \$420 billion in sales in 2021 (Statistia, 2019).

Mobile commerce can be of great benefits to businesses, customers, and governments (Swilley et al., 2012). For businesses, mobile commerce can help streamline and reduce physical offices or branches used to provide services to customers (Jun & Palacios, 2016). This can help save operating costs for businesses (Lin et al., 2011). Armed with only a wireless Internet-connected mobile device, customers can search for relevant information or make purchases directly through companies or retailers' websites (Chong et al., 2012).

In addition, mobile commerce can help businesses integrate more deeply into the global economy as the world increasingly becomes flatter where people can connect with each other anytime at anywhere (Wu & Chuang, 2010). Businesses can sell products/services produced in one country to customers in another without having their physical presence in the foreign country (Javalgi et al., 2005). Further, due to the fact that mobile device users increasingly have access to social networks to share their preferences about products and services, mobile commerce can help businesses implement more effective advertising and promotion programs towards different groups of customers on social networks while keeping costs down (Wei et al., 2009).

For governments, the emergence and development of mobile commerce serve as the catalyst that helps the government become more digitized (Trimi & Sheng, 2008). This allows a government to evolve into a smart one. So digitized, its functions and mandates for creating economic and legal information technology (IT), as well as Internet frameworks, provide favorable conditions for more actors in the economy to exchange information, conduct business activities, and trade products/services in the most convenient way at anytime, anywhere (Hung et al., 2013). In other words, the development of mobile commerce can promote the development of the government and, in turn, support mobile commerce to reach its full potential, ultimately creating value for all entities involved in mobile commerce (Abu-Shanab & Haider, 2015).

One of the factors determining the success of mobile commerce is that customers accept mobile commerce to conduct e-transactions relating to information, products and services (Chong et al., 2012). There have been a number of studies on the factors affecting mobile commerce adoption and acceptance,

but these studies were mainly conducted in developed countries. Very little mobile commerce research has been carried out in newly emerging countries with very high economic growth rates such as Vietnam with the 2018 economic growth rate of 7.08 percent (Hieu Cong, 2018). With significant improvements in wireless Internet technology and mobile devices, and the development of 3G, 4G, and potential 5G networks, mobile commerce in Vietnam has significant potential for mobile commerce development (Thuy Dieu, 2018).

Turning this potential into reality requires comprehensive and systematic research on the factors affecting customers' intention to use mobile commerce in Vietnam. With existing research virtually nil, this study aims to overcome the research gap. This study seeks to contribute to the literature in several ways. First, since Vietnam is a newly emerging country (Pham et al., 2019), this study is probably the first systematic and comprehensive one on the factors affecting intention to use mobile commerce in this nation. Second, with its politically and economically strategic position in Southeast Asia, Vietnam is expected to be a destination for investment and trade activities of multinational companies. This study can aid multinational companies wishing to do business in Vietnam have a sense of mobile commerce in there and build appropriate strategies to invest in mobile commerce. Third, this study helps mobile commerce enterprises in Vietnam understand more about Vietnamese customers' experiences, thereby improving customers' intention to use mobile commerce.

Thus the overarching objective of this study is to explore the factors that influence intention to use mobile commerce in the context of Vietnam. In the following sections, the literature review is discussed, the research model and hypotheses are developed, and the research method is concretized. Finally, research results, discussions of research results, conclusion, and future research directions are discussed.

LITERATURE REVIEW

Characteristics of Mobile Commerce

Tremendous advances in information and communication technology, wireless Internet infrastructure, and mobile devices have profoundly changed the commerce environment that evolved from traditional commerce to e-commerce and now is stepping into mobile commerce (Ngai & Gunasekaran, 2007). While e-commerce has inherited some attributes from traditional commerce, so too has mobile commerce inherited some attributes from e-commerce (Turban et al., 2015).

To date there have been numerous studies on mobile commerce, offering various concepts of it (Yang et al., 2015). Some researchers argue that mobile commerce is a sub-unit or an extension of e-commerce, so the characteristics of e-commerce can generally be applied to mobile commerce (Hu et al., 2015). Other researchers contend that mobile commerce can be defined as any activity or form of business that involves money-value transactions conducted via a mobile network (Sharma et al., 2015). Still other researchers define mobile commerce under the ecosystem perspective. An ecosystem includes business models based on mobile phones, tablets, applications, and operating systems (Ivanochko et al., 2015).

Mobile commerce includes not only money-value transactions, but also activities prior, during and after purchases via mobile devices connected to the wireless Internet, such as marketing activities or programs on the mobile environment (Omonedo & Bocij, 2014). When considering mobile commerce as an extension of e-commerce, mobile commerce can also be categorized into C2C mobile commerce,

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B2B mobile commerce, B2C mobile commerce, G2B mobile commerce, G2C mobile commerce, or G2G mobile commerce (Trimi & Sheng, 2008).

This study follows the approach that m-commerce is an evolution of e-commerce, in that it involves transactions, exchanges, and value activities both monetary and non-monetary in nature that are conducted via mobile devices using the Internet. These transactions, exchanges or activities involve the transfer of ownership or rights to use products and or services.

Although mobile commerce has evolved from e-commerce, it has unique characteristics that e-commerce does not have (Chong et al., 2012):

- **Ubiquity:** This is the outstanding feature of mobile commerce. Customers can connect to the wireless Internet network via mobile devices at any time in anywhere to search for information or conduct exchanges and trading activities;
- **Reachability:** In mobile commerce, with the support of the Internet and mobile devices (for example, smartphones and tablets), customers can reach any company with which they want to make transactions;
- **Locationalization:** In mobile commerce, identifying customers' locations plays a very important role in creating better service experiences for customers. With customers' location information, companies can provide location-based applications. For example, in mobile banking, knowing the location of customers allows banks to provide information about ATMs near their customers' so that if customers need to withdraw cash, they can do so in a convenient way;
- **Personalization:** A variety of information, services and applications exist in mobile commerce. Each customer can search for needed information and applications to conduct transactions or make purchases. In other words, providing personalized products and services for customers in mobile commerce can increase customer satisfaction;
- **Dissemination:** Most customers participating in mobile commerce own smartphones or tablets, and join social networks for purposes of entertainment or exchange of information relating to purchases of products/services. Consequently, the distribution of information in mobile commerce is very high. Companies can approach, notify or advertise to a wide range of customers at the same time. Customers can spread information of interest to each other simply and quickly in mobile commerce;
- **Convenience:** Hand-held mobile devices in mobile commerce generate convenience for customers. With advances in technology, portable mobile devices are significantly improved and modernized with a high level of aesthetics and attributes similar to desktop computers, but their size is small enough to be easily carried. Mobile devices can immediately be connected to the wireless Internet, to other mobile devices, or to databases thereby producing favorable conditions for customers to conduct their transactions;
- **Interactivity:** In mobile commerce, the interfaces, functions, utilities, and services are highly interactive. The results of these electronic interactions can be immediately effective. For example, searching for relevant information, choosing preferred products or services, and making purchase decisions via credit/debit cards are immediately effective after the customer provides payment information and presses the "OK" button.

Mobile Commerce in the Context of Vietnam

Vietnam is an emerging country with a lot of potential for economic development (Pham & Anh, 2014). Located in a strategic position in Southeast Asia, Vietnam is expected to become an economic center that attracts many multinational companies to do business (Pham et al., 2018). The leading countries investing in Vietnam include the U.S., China, Taiwan, Japan, and Korea. Vietnam's economy started to prosper since its implementation of economic reform programs in 1986 (Pham et al., 2019). The overarching objective of these economic reform programs was to transform its economy from a centralized planning economy to a market-oriented economy (Long & Vy, 2016). Thanks to the economic reform programs, Vietnam has achieved impressive economic achievements, including an especially high annual economic growth rate (Long & Thanh, 2016). Vietnam's economic growth rate in 2018 was 7.08 percent (Hieu Cong, 2018). Some forecasters predict Vietnam's economic growth rate will keep going up (DTCK, 2018).

According to a recent study by Nielsen, Vietnam has nearly 100 million people. On average, a Vietnamese person owns 1.3 mobile phones, of which smartphones account for about 70 percent. This rate is probably much higher in Vietnam's major cities (Vietinbank, 2017). Another study by Google suggested that an average smartphone user would touch his or her phone about 150 times a day, equivalent to more than 10 times an hour. About 75 percent of Vietnam's population under 35 years old often use smartphones instead of desktop computers for a variety of purposes, for example, information search, discussions on social networks, entertainment activities, or purchases of goods or services (Quoc Phan, 2016). Currently, about 49 percent of businesses receive orders through mobile applications, and sales through mobile applications account for 50 - 60 percent of total revenue (Vietinbank, 2017). Thus, it can be said that Vietnam still has a lot of room for domestic and foreign businesses to cultivate their business activities in the mobile commerce environment.

Vietnam can be considered a country with quite good Internet infrastructure characterized by high speed and coverage of over 60 percent of its population, including rural areas. It should be noted that in Vietnam, about 72 percent of Vietnam's population own smartphones that can be connected to the Internet. Among smartphone users, 70 percent have purchased at least one product or service via smartphone (XHIT, 2017). This indicates that using smartphones to participate in mobile commerce activities is becoming familiar and seen as a new shopping trend of Vietnamese consumers.

Factors Affecting Intention to Use Mobile Commerce

Mobile information and communication technology and wireless Internet technology have changed the interactions between companies and customers, especially in the mobile commerce environment (Lin et al., 2011). Mobile commerce is expected to bring benefits to all actors involved in it (Chong et al., 2012). These benefits include an increase in flexibility, mobility, interactivity, and ubiquity, making favorable conditions for business transactions conducted in a convenient and simple way via mobile devices (smartphones, tablets, or PDA - personal digital assistants) (Gupta & Vyas, 2014; Zamfiroiu, 2014).

There has been a lot of research to date about the factors affecting mobile commerce acceptance (Ivanochko et al., 2015). These factors stem from popular theories or models, such as the theory of reasoned action (TRA), the theory of planned behavior (TPB), the technology adoption model (TAM), the innovation diffusion theory (IDT), the task technology fit (TTF) model; and the unified theory of acceptance and use of technology (UTAUT) (Chong et al., 2012).

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In e-commerce studies, factors such as trust, cost, and variety of services have been proved as important factors affecting e-commerce adoption (Chong et al., 2012). With m-commerce, previous studies have indicated some common factors affecting mobile commerce adoption. These include trust, cost, social influence, variety of services, while others such as perceived usefulness, perceived ease of use, and trialability have arisen. These m-commerce factors are extracted from the popular theories or models, consisting of social influence mentioned by UTAUT, TRA (subjective norms), and TPB (subjective norms); perceived ease of use by TAM, IDT (ease of use, complexity), TPB (perceived behavioral control), and UTAUT (effort expectancy); perceived usefulness by TAM, UTAUT (performance expectancy), and IDT (relative advantage); trialability by IDT.

Chong et al. (2012) has developed a mobile commerce acceptance model. The reason this model is particularly important for this study is because the model identifies essential factors affecting intention to use mobile commerce.

Moreover, the model has been used by Chong et al. (2012) to conduct studies in China and Malaysia. These countries have similarities with Vietnam. Vietnam and Malaysia are both members of ASEAN. China is one of Vietnam's largest trading partners, and the two countries share some economic and cultural attributes. As previously noted, Vietnam has a population of about 100 million people and a very high economic growth rate. Vietnam's Internet infrastructure is quite good, and its number of smartphone users is increasing. Vietnam is among the top countries in the export of textiles, rubber, coffee, rice, and cashew nuts. Given its economic growth potential, it is surprising that there are no systematic and comprehensive studies on the factors affecting intention to use mobile commerce in Vietnam.

RESEARCH MODEL

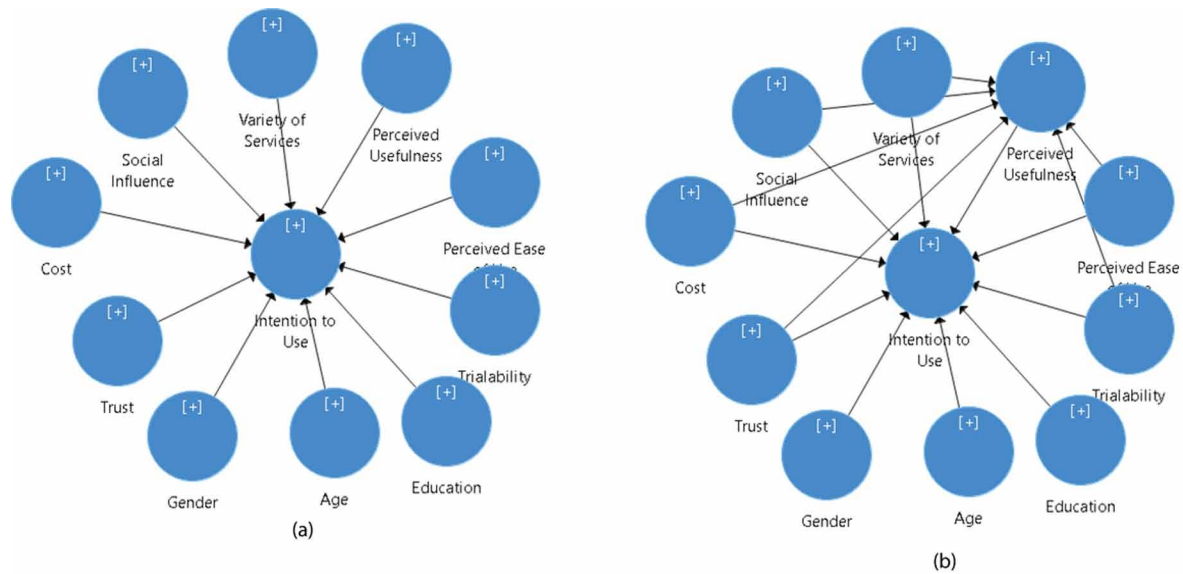
One of the objectives in this study is to identify the factors that influence intention to use mobile commerce in a new research environment, Vietnam. However, this study is different from the study of Chong et al. (2012) and others on mobile commerce in the sense that the role of perceived usefulness receives greater emphasis. Previous research has shown that certain factors indirectly impact via perceived usefulness the intention to use technology. Two models will be tested in this study. Model A does not have indirect impacts via perceived usefulness and Model B includes indirect impacts via perceived usefulness (see Figure 1). It should be noted that Model B not only consists of all the hypotheses specified in Model A, but also expands to test indirect effects of the factors on intention to use via perceived usefulness (H8, H9, H10, H11, H12, and H13).

Model A: Direct Effects

Perceived Ease of Use

Perceived ease of use and perceived usefulness are two important variables in TAM (Pham et al., 2013). Perceived ease of use is also expressed by different names in other models/theories, such as complexity in IDT, perceived behavioral control in TPB, and effort expectancy in UTAUT. Perceived ease of use is defined as the level at which a person believes that using a new information technology or system will not require significant effort (Davis, 1989). Studies have shown that perceived ease of use affects intention to use e-commerce (Oliveira et al., 2014). If mobile commerce is a special case of e-commerce, then

Figure 1. Research models



perceived ease of use is defined as the degree to which a person believes that using mobile commerce for transactions of goods/services or information at any time, anywhere will not require significant effort. Customers' mobile commerce use can range in detail from a low to high level, for example, from searching for information about products/services, to making comparisons and selecting products/services of interest, and finally to buying the most preferred of these (Yang et al., 2015). If all these stages are simple and without much effort, customer intention to use mobile commerce is high (Wu & Wang, 2005). Therefore, the following hypothesis is proposed:

H1: There is a positive relationship between perceived ease of use and intention to use mobile commerce in Vietnam.

Perceived Usefulness

Perceived usefulness is an important factor in many models of technology adoption (Jeyaraj et al., 2006). Perceived usefulness is one of the two fundamental variables (besides perceived ease of use) in TAM (Davis, 1989). It is referred to as performance expectancy in UTAUT and relative advantage in IDT. Perceived usefulness is considered the extent at which a person believes that using a certain technology or information system will enhance his or her work results (Davis, 1989). Empirical studies have confirmed that perceived usefulness is one factor that influences intention to use e-commerce (Gumussoy & Calisir, 2009). Mobile commerce is a special case of e-commerce (Hu et al., 2015). Mobile commerce includes customers' activities related to accessing websites to search for information, comparing products/services of interest, and ultimately purchasing preferred products/services (Yang et al., 2015). All these activities are conducted via mobile devices such as smartphones connected to the wireless Internet (Varshney & Vetter, 2002). If customers feel that mobile commerce offers them benefits, their

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intention to use mobile commerce will be high (Lu et al., 2005). In line with previous empirical studies, the following hypothesis is proposed:

H2: There is a positive relationship between perceived usefulness and intention to use mobile commerce in Vietnam.

Trust

Trust is considered an important factor in almost all transactions or interactions in economic and social sectors (Pavlou, 2003). Transactions or interactions that require a high probability of success all need to be based on trust (Pham & Anh, 2014). In the traditional business environment characterized by interactions between customers and employees of the company, and in the online business environment characterized by interactions between customers and websites of the company, trust is the catalyst for expectations about successful transactions (Holsapple & Sasidharan, 2005).

E-commerce is characterized by interactions between customers and the company's website, so the level of uncertainty and risk can be greater than that of traditional commerce (Pavlou, 2003). Mobile commerce is a special case of e-commerce and is characterized by the fact that customers conduct transactions through mobile devices that connect to the wireless Internet (Gupta & Vyas, 2014). Exchanges and transactions in mobile commerce can be conducted at anytime in anywhere, not limited by space and time (Hu et al., 2015). These characteristics of mobility and ubiquity make mobile commerce more uncertain and riskier than e-commerce (Chong et al., 2012). Consequently, trust is a significant prerequisite for successful transactions in mobile commerce.

Trust often relies on the trusting people's beliefs that the trustee has the ability, integrity and benevolence consistent with the trusting person's expectations for their exchange (Wang et al., 2016). Integrity means that the person who is trusted will adhere to principles and rules of exchanges which are acceptable in the view of the trusting person, while benevolence refers to the extent to which the trusted person is believed to be capable of doing good things for the trusting person aside from their personal profit goals (Wang et al., 2016).

Trust allows the trusting party to be vulnerable to exchanges and transactions with the trusted party (Wei et al., 2009). The trusting party believes that the trusted party will not take advantage of the trusting party in transactions and exchanges and that is a basis for expectations about the success of these transactions and exchanges (Holsapple & Sasidharan, 2005). Empirical studies in traditional commerce, e-commerce and mobile commerce indicate that trust is a major deciding factor favoring the intention to use mobile commerce (Cheng et al., 2012). Therefore, the following hypothesis is proposed:

H3: There is a positive relationship between trust and intention to use mobile commerce in Vietnam.

Variety of Services

Mobile commerce is a major development trend in transactions and exchanges in the world (Bang et al., 2013). Mobile commerce can provide a number of benefits to customers (Chong et al., 2010). One of these is service availability. Customers can conduct exchanges and transactions at anytime, anywhere (not limited by space and time) through mobile devices connected to the wireless Internet (Wei et al., 2009). Customers also have many opportunities to enjoy a wide range of entertainment services, such

as listening to music, watching movies, or playing games on mobile devices (smartphones, tablets or PDAs) (Chong et al., 2012).

Although other value-added services in mobile commerce, such as mobile banking and investment consulting services, have become popular in developed countries, they are still limited in Vietnam. In order to attract more people to join mobile commerce, it would seem necessary to have many applications with a variety of utilities and added value. Consistent with previous empirical studies on mobile commerce, the following hypothesis is proposed:

H4: There is a positive relationship between variety of services and intention to use mobile commerce in Vietnam.

Social Influence

Social influence refers to the degree to which one person perceives the importance that other people place on whether he or she should act in a certain way (Attuquayefio & Addo, 2014). Studies indicate that a person tends to use a certain technology if other people who are important to them think that she or he should use it (Foon & Fah, 2011). Each individual's life is surrounded by family members, colleagues, friends, and members of social networks. These people often share their views of life, work, and shopping behaviors with each other (Wang & Kang, 2014). These people's views are very likely to have impacts on one's intentions to use a given technology.

Mobile commerce as a special case of e-commerce can be considered a technology. Therefore, someone's intention to use mobile commerce can be influenced by family members, friends, colleagues, or members of social networks who are important to him or her (Chong et al., 2012).

Empirical studies on intention to use technology, including mobile commerce, have added social influence as a factor and indicate that it is positively related to intention to use mobile commerce (Chong et al., 2012). Therefore, the following hypothesis is proposed:

H5: There is a positive relationship between social influence and intention to use mobile commerce in Vietnam.

Trialability

As previously note, about 75 percent of Vietnam's population under 35 years old often use smartphones instead of desktop computers for a variety of purposes, such as searching for relevant information, sharing opinions on social networks, enjoying entertainment activities, or buying products/services (Quoc Phan, 2016). Mobile commerce has a potential to grow and thrive in Vietnam in the coming time (Thuy Dieu, 2018).

However, from interviews with Vietnamese customers, it is argued that many Vietnamese people want to experience free trials from mobile commerce before planning to purchase. Consequently, Vietnamese people are enjoying a lot of free products/services in the mobile commerce environment. Free trial products/services include mobile banking services, mobile securities investment and consulting services, and other entertainment services. Since mobile commerce is a subset of e-commerce (Gupta & Vyas, 2014) and evidence exists from empirical studies in the e-commerce environment suggesting

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that trialability is one of the determinants of intention to use e-commerce (Tan & Teo, 2000), therefore, the following hypothesis is proposed:

H6: There is a positive relationship between trialability and intention to use mobile commerce in Vietnam.

Cost

Mobile commerce is attracting public attention in Vietnam, especially with young people (Thuy Dieu, 2018). To participate in mobile commerce, customers need to invest in a mobile device that is connected to the wireless Internet. Popular mobile devices that customers often equip for themselves include smartphones, tablets and PDAs. When participating in mobile commerce, customers have to incur other expenses. These expenses include wireless Internet connection fees (3G, 4G or 5G networks).

However, with relatively limited disposable income young customers in Vietnam, especially students in universities, are very sensitive to prices, fees and costs. These customers will compare the benefits they can get and the expected costs incurred to decide whether to participate in mobile commerce. Evidence from previous empirical studies indicate that cost is a hindrance to intention to use mobile commerce (Chong et al., 2012). Therefore, the following hypothesis is proposed:

H7: There is a negative relationship between cost and intention to use mobile commerce in Vietnam.

Studies indicate that demographic variables are factors that influence technology acceptance, including e-commerce and mobile commerce. Common demographic variables include gender, age and education (Chong et al., 2012). Therefore, in this study, these variables are treated as control variables in order to investigate the effects of trust, cost, social influence, variety of services, perceived usefulness, perceived ease of use, and trialability on intention to use mobile commerce in Vietnam.

Model B: Direct Effects and Indirect Effects via Perceived Usefulness

Model B consists of Hypotheses 1 – 7 and the following hypotheses.

Perceived ease of use and perceived usefulness are two fundamental variables in the TAM model developed by Davis (1989). In this model, perceived ease of use has a positive effect on perceived usefulness. This relationship has been confirmed in numerous empirical studies on information technology adoption (Dishaw & Strong, 1999; Gefen & Straub, 2000; Venkatesh & Davis, 2000) and Internet adoption (Gefen & Straub, 2002; Lederer et al., 1999; Moon & Kim, 2001). Mobile commerce is a special case of e-commerce and evidence from empirical research on e-commerce acceptance indicates that perceived ease of use has positive impacts on perceived usefulness (Pavlou, 2003). Therefore, the following hypothesis is proposed:

H8: There is a positive relationship between perceived ease of use and perceived usefulness in the mobile commerce environment in Vietnam.

Trust is one of the key factors that determines the success of economic and social exchanges/transactions in both the traditional commerce and e-commerce environments (Gao & Waechter, 2017; Liebana-Cabanillas & Alonso-Dos-Santos, 2017). The e-commerce environment is characterized by interactions

between customers and the company's website, so the level of security and privacy risks is greater than that of the traditional commerce environment where the exchange can be monitored directly (Oliveira et al., 2017). A number of studies have integrated trust into the TAM model to study consumer acceptance of new technology. The results of these studies show that trust is positively related to perceived usefulness (Chircu et al., 2000; Gefen, 1997; Gefen & Straub, 2002). In the e-commerce environment, Pavlou (2003) has shown that trust has a positive effect on perceived usefulness. Moreover, Luo et al. (2010) pointed out that trust positively influences performance expectations in the mobile banking environment. Therefore, the following hypothesis is proposed:

H9: There is a positive relationship between trust and perceived usefulness in the mobile commerce environment in Vietnam.

The advantage of mobile commerce is that customers can make transactions and interactions easily, not limited by time and space (Pavithran et al., 2014; Yadav et al., 2016). Participating in mobile commerce, customers also want to enjoy entertainment services such as listening to music, watching movies, and playing games (Wei et al., 2009). Mobile commerce also helps customers enjoy mobile banking services (Hanafizadeh et al., 2014). Through wireless Internet-connected mobile devices, customers can check account balances, make money transfers, and pay bills in a simple and convenient way (Malaquias & Hwang, 2016). Evidence from research on e-banking services shows that variety of services has a positive relationship with overall e-banking service quality, customer satisfaction and loyalty (Long & Vy, 2016). Mobile commerce is a special form of e-commerce development, therefore, the following hypothesis is proposed:

H10: There is a positive relationship between variety of services and perceived usefulness in the mobile commerce environment in Vietnam.

Studies on e-commerce show that social influence is an important factor influencing e-commerce adoption/acceptance (Hsu & Chiu, 2004; Lu et al., 2005; Zhou, 2011). Empirical evidence also indicates that social influence is positively related to mobile commerce adoption/acceptance (Chong et al., 2012). The life of a person is always surrounded by members of family, colleagues, friends, or team members on social networks (Lin et al., 2016; Yadav et al., 2016). An individual's intention to use mobile commerce is significantly influenced by these people. Lu (2014) found that social influence affects intention to use mobile commerce through perceived usefulness. In line with the results of Lu (2014), the following hypothesis is proposed:

H11: There is a positive relationship between social influence and perceived usefulness in the mobile commerce environment in Vietnam.

Trialability refers to situations in which customers are provided with free trials to enjoy services or products. In the mobile commerce environment, providing free trials can increase customer interest in mobile commerce and if customers have good experiences with services/products in free trials, their intention to use mobile commerce will increase. Empirical evidence indicates that trialability has a positive relationship with e-commerce adoption (Tan & Teo, 2000). Furthermore, trialability has a positive relationship with cell phone banking acceptance (Brown et al., 2003). Although Chong et al. (2012) did

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not find a positive relationship between trialability and mobile commerce adoption, the current study argues that it is likely that trialability affects intention to use mobile commerce via perceived usefulness. Therefore, the following hypothesis is proposed:

H12: There is a positive relationship between trialability and perceived usefulness in the mobile commerce environment in Vietnam.

To participate in mobile commerce, customers are subject to certain costs, such as the cost of buying mobile devices (mobile phones, tablets, or PDAs). Besides, customers also have to pay for 3G, 4G or 5G networks every month. Empirical research indicates that cost is negatively related to intention to use mobile commerce (Chong et al., 2012; Wei et al., 2009). Although previous studies focused only on the impact of cost on intention to use mobile commerce, this study argues that cost can affect perceived usefulness. Therefore, the following hypothesis is proposed:

H13: There is a negative relationship between cost and perceived usefulness in the mobile commerce environment in Vietnam.

METHODOLOGY

Survey Instrument Translation into Vietnamese

Content validity of the survey instrument is achieved through assessing whether the items measure exactly what they are supposed to measure (Nunnally, 1978). In order to obtain content validity, the measurement scales in this study were adapted from Chong et al. (2012). These measurement scales were synthesized by Chong et al. (2012) based on their review of the literature and were confirmed in terms of reliability and validity. These measurement scales were again validated in a study of mobile commerce in China and Malaixia by Chong et al. (2012).

A Vietnamese scholar translated the questionnaire into Vietnamese. Another researcher who was fluent in both English and Vietnamese translated the Vietnamese version of the questionnaire back into English to check the consistency between both Vietnamese and English versions. Two scholars who were fluent in both Vietnamese and English checked both versions independently and confirmed that the translation was accurate and consistent. The preliminary questionnaire of the Vietnamese version was pre-tested by 20 subjects who were experienced with mobile commerce use (10 of whom were students). Some adjustments to the wording were made on the basis of pre-test feedback.

A short version of measurement scales is provided in Appendix. As indicated in this appendix, the measurement scales include six items for the “trust” construct, five items for cost, three items for social influence, three items for variety of service, four items for perceived usefulness, four items for perceived ease of use, three items for trialability, and three items for intention to use mobile commerce. The evaluation of the items was based on the subject’s perception of mobile commerce via a five-point Likert scale with 1 meaning “strongly disagree” and 5 indicating “strongly agree.”

Data Collection

A convenience sample of Vietnamese college students was employed to study factors affecting intention to use mobile commerce. Studies have shown that students today are a significant customer group of mobile commerce, very knowledgeable in information technology. Since most own smartphones or other mobile personal devices which can access the Internet, using this sampling approach was deemed appropriate.

Data collection was conducted through the help of a leading University in economics and business administration in Vietnam. Specifically, this institution’s School of Advanced Education Programs helped to collect data from the student subjects. Approximately 4,000 students are enrolled in study programs related to economics and business administration through the School. A sample of 700 students were sent an invitation letter to participate in this survey. These students were also encouraged to give the questionnaire to their relatives and friends to participate in the survey.

A total of 551 responses were returned, of which 55 were excluded because of a lack of information, incomplete filling, or for choosing the same response level for all items of the factors influencing intention to use mobile commerce. This resulted in 496 usable responses for subsequent statistical analysis. Table 1 summarizes the respondents’ demographic information.

Table 1. Profiles of the survey respondents

Profile	Category	Total	Proportion (Percent)
<i>Gender</i>	Male	271	54.6
	Female	225	45.4
<i>Age</i>	Less than 20	134	27.0
	20 – 24	137	27.6
	25 – 34	68	13.7
	35 – 44	72	14.5
	45 – 54	85	17.1
<i>Education</i>	High school	119	24.0
	Bachelor degree	244	49.2
	Master degree or above	133	26.8
<i>Checking/posting advertisements</i>	Never	128	25.8
	Seldom	85	17.1
	Sometimes	110	22.2
	Often	104	21.0
	Always	69	13.9
<i>Entertainment purpose</i>	Never	26	5.2
	Seldom	67	13.5

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Table 1. Continued

Profile	Category	Total	Proportion (Percent)
	Sometimes	121	24.4
	Often	222	44.8
	Always	60	12.1
<i>Location-based services</i>	Never	20	4.0
	Seldom	60	12.1
	Sometimes	208	41.9
	Often	150	30.2
	Always	58	11.7
<i>Mobile banking</i>	Never	58	11.7
	Seldom	92	18.5
	Sometimes	159	32.1
	Often	132	26.6
	Always	55	11.1
<i>Purchasing products/services</i>	Never	31	6.3
	Seldom	97	19.6
	Sometimes	176	35.5
	Often	127	25.6
	Always	65	13.1

Male respondents accounted for 54.6 percent. By age, 54.6 percent of the respondents were under 25 years old, 28.2 percent between 25 and 44 years old, and 17.1 percent between 45 and 54 years old. Regarding the respondents' highest education level, 24 percent had a high school diploma, 49.2 percent bachelor's degrees, and 26.8 percent master's degrees or above. For applications of mobile commerce with regard to respondents noting "often" or "always," 34.9 percent for "checking/posting advertisements", 56.9 percent for "entertainment purposes", 41.9 percent for "location-based services", 37.7 percent for "mobile banking," and 38.7 percent for "purchasing products/services."

The sample in this study was satisfactory for obtaining reliable PLS results. Since the most complex construct in the research model, intention to use mobile commerce, had 7 predictors (factors), a minimum sample size of 70 would be required (Chin, 1988). The actual minimum sample size in this case proved to be 10 times the most complex relationships in the research model.

A non-response bias test was conducted. There seemed to be no serious concern because there were no significant differences between survey participants who responded early and survey participants who responded late in terms of key measures. Following the procedures suggested by Armstrong and Overton (1977), t-tests indicated that there were no significant differences between these two groups of respondents with respect to key measures at the 5 percent significance level. Therefore, it can be concluded that non-response bias did not seem to be a major concern.

Statistical Analysis

Descriptive statistics, correlation coefficients, and structural equation modeling were employed. Structural equation modelling was used to estimate the path coefficients between latent variables. The full model is considered reliable and valid when both measurement and structural models are statistically reliable and valid. Therefore, Bollen's (1989) two-step approach was followed in which the measurement model was validated first and then the structural model was analyzed to test the hypotheses. SPSS 25 and SmartPLS 3 were utilized for data analysis. The reason for using SmartPLS was that the main focus of this study was to analyze the respective impacts (predictive power) of trust, cost, social influence, variety of services, perceived usefulness, perceived ease of use, and trialability on intention to use mobile commerce. Moreover, SmartPLS does not require rigorous assumptions, for example, normal distribution and equal variance.

RESULTS

Statistical analysis was implemented based on two steps. Step 1 involved testing the measurement model through confirmatory factor analysis to see if the measurement model was a good fit to the data. Step 2 involved analyzing the structural model to test the hypotheses.

Before conducting the main analyses, variables' descriptive statistics were reviewed and the results indicated no outliers. The sample size of 496 was large enough for analyzing complex structural models. For variables with missing values, their respective means were used for these missing values. The use of mean values increases estimated parameters' accuracy on the basis of reducing sample variation and bias for parameter estimates.

Because the survey instrument included multiple items to represent each construct (latent variable), assessing all constructs' validities was necessary. Convergent validity of a construct is analyzed based on its reliability. A factor with high convergent validity includes items which have strong correlation coefficients due to the fact that these items measure the same construct. The measurement model's reliability statistics are summarized in Table 2. The measurement model was verified through confirmatory factor analysis. The results showed that there were two items with factor loadings lower than 0.5 or being loaded on different factors, so these two items were excluded from the measurement model.

Since the self-reported data collected from a single source was used, statistical analyses were conducted to assess whether common method bias existed in the survey. First, the Harmon's single factor test was performed (Podsakoff et al., 2003). In this test, all items that measured abstract variables were loaded onto only one factor. The results showed that this single factor explained less than 50 percent of the variability (the cut-off value level). Furthermore, multicollinearity analyses were carried out and the results showed that all the outer VIF values were smaller than the cut-off value 3.3 (except for one item, trust at 3.439, which is far from any alarm level of five or 10 suggested by Kock (2015)). All inner VIF values were smaller than 3.3. Based on the results of the Harmon's single factor test and VIF values, it can be concluded that common method bias was not a major concern in this survey.

Next, Cronbach's alpha coefficients and composite reliability coefficients were considered. Table 2 indicates that Cronbach's alpha coefficients were greater than 0.7 (Nunnally, 1978) and composite reliability coefficients were greater than 0.8 (the cut-off value, 0.7) (Fornell & Larcker, 1981). Items loaded on their designated factors with loading values greater than 0.5 (Fornell & Larcker, 1981). All the factor loadings were statistically significant at p-value less than 0.01. Therefore, the measurement model indicated a good fit to the data.

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Table 2. The measurement model statistics

Construct	Indicator	Standardized Loading	AVE (Average Variance Extracted)	Cronbach's Alpha	Composite Reliability
<i>Trust</i>	Tru1	0.906	0.778	0.929	0.946
	Tru2	0.870			
	Tru3	0.872			
	Tru4	0.898			
	Tru5	0.864			
<i>Cost</i>	C1	0.847	0.596	0.774	0.855
	C3	0.783			
	C4	0.703			
	C5	0.750			
<i>Social influence</i>	SI1	0.918	0.825	0.894	0.934
	SI2	0.898			
	SI3	0.910			
<i>Variety of services</i>	VS1	0.871	0.691	0.778	0.870
	VS2	0.866			
	VS3	0.752			
<i>Perceived usefulness</i>	PU1	0.908	0.789	0.866	0.918
	PU2	0.872			
	PU3	0.884			
<i>Perceived ease of use</i>	PEU1	0.872	0.720	0.806	0.885
	PEU2	0.825			
	PEU3	0.848			
<i>Trialability</i>	TRI1	0.837	0.655	0.737	0.851
	TRI2	0.769			
	TRI3	0.820			
<i>Intention to use</i>	IU1	0.917	0.800	0.876	0.923
	IU2	0.893			
	IU3	0.873			

Discriminant validity of a construct implies that this construct is different from other constructs. Discriminant validity can be evaluated by comparing the construct’s AVE square root with correlation coefficients corresponding to this construct. Table 3 indicates that the diagonal components were the square root of AVEs and the non-diagonal components were the correlation coefficients between the corresponding constructs and other constructs. All components on the diagonal were larger than correlation coefficients in the corresponding column, indicating high discriminant validity (Fornell & Larcker, 1981). In summary, the measurement model had high reliability, low multicollinearity, and high convergent and discriminant validity.

Table 3. Construct correlations and discriminant validity

Constructs	TRU	C	SI	VS	PU	PEU	TRI	IU
<i>Trust (TRU)</i>	0.882							
<i>Cost (C)</i>	0.572	0.772						
<i>Social influence (SI)</i>	0.576	0.456	0.908					
<i>Variety of services (VS)</i>	0.487	0.440	0.515	0.831				
<i>Perceived usefulness (PU)</i>	0.580	0.447	0.600	0.557	0.888			
<i>Perceived ease of use (PEU)</i>	0.492	0.403	0.468	0.523	0.556	0.849		
<i>Trialability (TRI)</i>	0.435	0.362	0.452	0.453	0.554	0.582	0.810	
<i>Intention to use (IU)</i>	0.435	0.347	0.469	0.535	0.561	0.534	0.580	0.895

Note: The diagonal elements in bold are the square roots of the average variance extracted. The offdiagonal elements are the correlations between constructs. For discriminant validity, the diagonal elements should be larger than any other corresponding row or column entry. All the correlation coefficients were significant at $p < 0.01$ level.

The results from analyzing factors influencing intention to use mobile commerce in Model A (direct impacts) is presented in Figure 2.

Figure 2 shows that path coefficients are positive for trust, social influence, variety of service, perceived usefulness, perceived ease of use, and trialability, while negative for cost. For the three control variables, path coefficients for sex and age are positive, while negative for education. The model explains 48 percent of the dependent variable’s variability – intention to use mobile commerce.

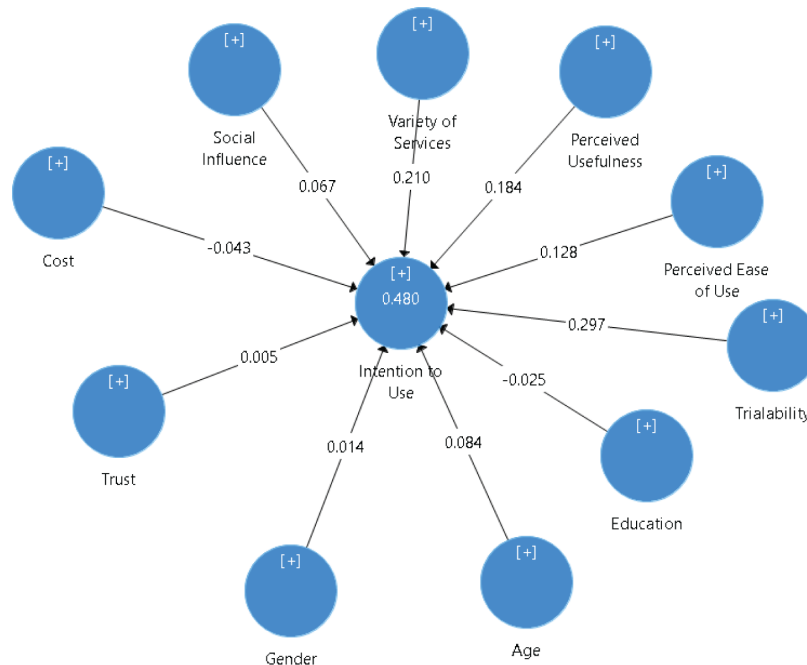
Figure 3 presents t-values for relationships between each independent variable and dependent variable.

Combining both Figure 2 and Figure 3 indicates that Hypothesis 1 – there is a positive relationship between perceived ease of use and intention to use mobile commerce in Vietnam - is statistically supported (path coefficient 0.128, t-value 2.044, p-value 0.041). Hypothesis 2 - there is a positive relationship between perceived usefulness and intention to use mobile commerce in Vietnam - is statistically supported (path coefficient 0.184, t-value 3.402, p-value 0.001). Hypothesis 3 - there is a positive relationship between trust and intention to use mobile commerce in Vietnam - is not statistically supported (path coefficient 0.005, t-value 0.083, p-value 0.933). Hypothesis 4 - there is a positive relationship between variety of services and intention to use mobile commerce in Vietnam - is statistically supported (path coefficient 0.210, t-value 4.138, p-value 0.000). Hypothesis 5 - there is a positive relationship between social influence and intention to use mobile commerce in Vietnam - is not statistically supported (path coefficient 0.067, t-value 1.277, p-value 0.202). Hypothesis 6 - there is a positive relationship between

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trialability and intention to use mobile commerce in Vietnam- is statistically supported (path coefficient 0.297, t-value 5.002, p-value 0.000). Hypothesis H7 - there is a negative relationship between cost and intention to use mobile commerce in Vietnam - is not statistically supported (path coefficient -0.043, t-value 0.832, p-value 0.406). All three control variables are not statistically significant.

Figure 2. Factors' direct impacts on intention to use mobile commerce



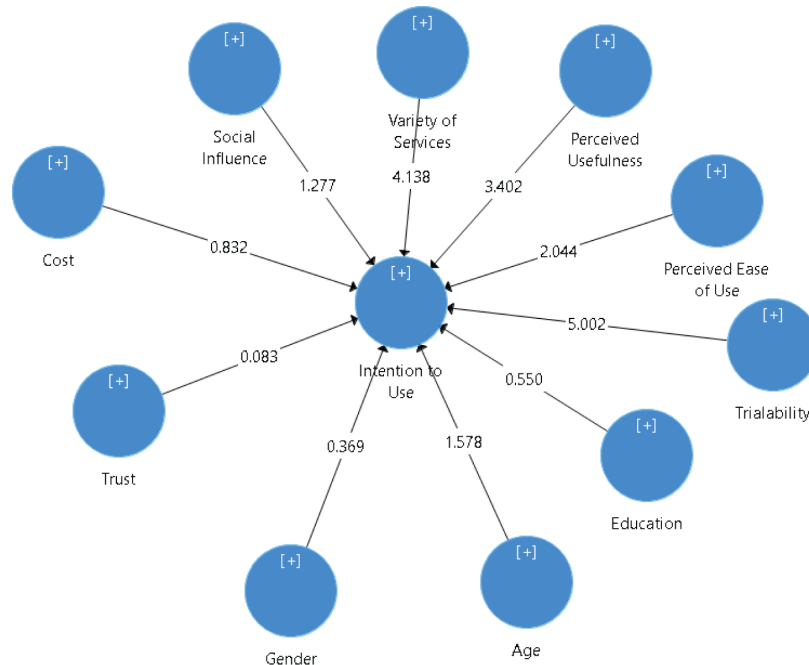
Model A seeks to explain factors' *direct impacts* on intention to use mobile commerce. Model A accounts for 48 percent of the dependent variable's variability: intention to use mobile commerce. Q^2 for Model A is 0.354 > 0, meaning that Model A has predictive relevant (Geisser, 1975; Stone, 1974). In addition, f^2 values for all the statistically statistical predictors in Model A are in the range of 0.02 and 0.15 (except for perceived ease of use, 0.017), indicating medium effect size (Cohen, 1988). Table 4 summarizes the results of hypotheses testing in Model A.

After examining factors' direct impacts on intention to use mobile commerce in Model A, factors' *direct and indirect impacts* on intention to use mobile commerce in Model B were investigated. Figure 4 presents path coefficient estimates in Model B.

Figure 5 presents t-values for path coefficients estimated in Model B. Combining Figure 4 and Figure 5, the results of hypotheses testing are consistent with the results of hypotheses testing in Model A. Hypothesis 1 – there is a positive relationship between perceived ease of use and intention to use mobile commerce in Vietnam - is statistically supported (path coefficient 0.129, t-value 2.129, p-value 0.038). Hypothesis 2 - there is a positive relationship between perceived usefulness and intention to use mobile commerce in Vietnam - is statistically supported (path coefficient 0.184, t-value 3.544, p-value 0.001). Hypothesis 3 - there is a positive relationship between trust and intention to use mobile commerce in Vietnam - is not statistically supported (path coefficient 0.004, t-value 0.069, p-value 0.942). Hypothesis

4 - there is a positive relationship between variety of services and intention to use mobile commerce in Vietnam - is statistically supported (path coefficient 0.211, t-value 3.998, p-value 0.000). Hypothesis 5 - there is a positive relationship between social influence and intention to use mobile commerce in Vietnam- is not statistically supported (path coefficient 0.067, t-value 1.309, p-value 0.217). Hypothesis 6 - there is a positive relationship between trialability and intention to use mobile commerce in Vietnam - is statistically supported (path coefficient 0.297, t-value 5.070, p-value 0.000). Hypothesis H7 - there is a negative relationship between cost and intention to use mobile commerce in Vietnam - is not statistically supported (path coefficient -0.045, t-value 0.911, p-value 0.387). All three control variables are not statistically significant.

Figure 3. T-value estimates for factors' direct impacts



Factors' indirect impacts on intention to use mobile commerce via perceived usefulness were analyzed in Model B. Hypothesis 8 - there is a positive relationship between perceived ease of use and perceived usefulness - is statistically supported (path coefficient 0.137, t-value 2.625, p-value 0.012). Hypothesis 9 - there is a positive relationship between trust and perceived usefulness - is statistically supported (path coefficient 0.192, t-value 3.659, p-value 0.000). Hypothesis 10 - there is a positive relationship between variety of services and perceived usefulness - is statistically supported (path coefficient 0.169; t-value 3.423, p-value 0.001). Hypothesis 11 - there is a positive relationship between social influence and perceived usefulness - is statistically supported (path coefficient 0.236, t-value 4.883, p-value 0.000). Hypothesis 12 - there is a positive relationship between trialability and perceived usefulness - is statistically supported (path coefficient 0.197, t-value 4.079, p-value 0.000). Hypothesis 13 - there is a negative relationship between cost and perceived usefulness - is not statistically supported (path coefficient 0.029, t-value 0.696, p-value 0.468). Model B accounts for 47.9 percent of the dependent

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variable's variability: intention to use mobile commerce, while perceived ease of use, trust, variety of services, social influence, and trialability all together account for 54.5 percent of the dependent variable's variability: perceived usefulness.

Table 4. Model A's hypotheses test results

Relationship	Hypothesis	Path Coefficient	t-Value	p-Value	R ²	f ²	Q ²	Results
PEU → IU	H1	0.128	2.044	0.041**	0.480	0.017	0.354	Accept
PU → IU	H2	0.184	3.402	0.001***		0.029		Accept
TRU → IU	H3	0.005	0.083	0.933 ^{ns}		0.000		Reject
VS → IU	H4	0.210	4.138	0.000***		0.048		Accept
SI → IU	H5	0.067	1.277	0.202 ^{ns}		0.005		Reject
TRI → IU	H6	0.297	5.002	0.000***		0.093		Accept
C → IU	H7	-0.043	0.832	0.406 ^{ns}		0.002		Reject

Notes: IU: intention to use mobile commerce; PEU: perceived ease of use; PU: perceived usefulness; TRU: trust; VS: variety of services; SI: social influence; TRI: trialability; C: cost; *p < 0.10; **p < 0.05; ***p < 0.001; ^{ns}: not statistically significant.

Figure 4. Factors' direct and indirect impacts on intention to use mobile commerce



Figure 5. T-value estimates for factors' direct and indirect impacts

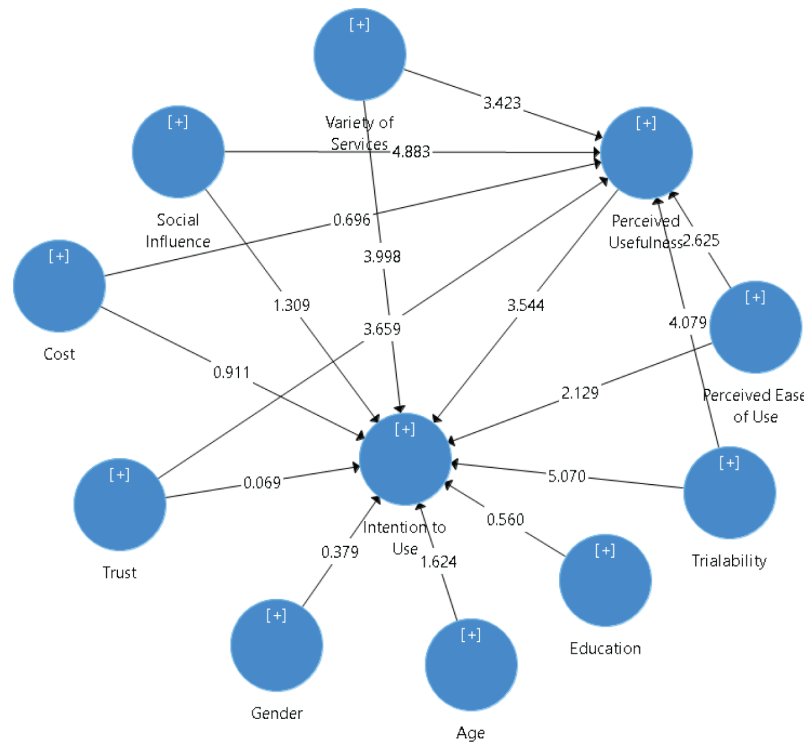


Table 5 summarizes the results of hypotheses testing in Model B. R^2 for intention to use mobile commerce is 0.479 while for perceived usefulness 0.545. Q^2 for intention to use mobile commerce is 0.354 > 0 while for perceived usefulness 0.402 > 0 , meaning that Model B has predictive relevance (Geisser, 1975; Stone, 1974). In addition, f^2 values for all the predictors are in the range of 0.02 and 0.15 (except for perceived ease of use, 0.017), indicating medium effect size (Cohen, 1988). The results of hypotheses testing in Model A are in line with that in Model B and Model A's adjusted R^2 is almost the same as Model B's adjusted R^2 . However, factors' indirect impacts on intention to use mobile commerce via perceived usefulness are shown in Model B. Thus, Model B is selected in the following discussions.

DISCUSSION

This study examines the factors affecting intention to use mobile commerce in Vietnam. The three control variables are gender, age and education. The results show that none of the control variables have effects on intention to use mobile commerce. Furthermore, there are four factors that have direct positive impacts on intention to use mobile commerce. These are perceived ease of use, perceived usefulness, variety of services, and trialability. Three factors do not have direct impacts on intention to use mobile commerce, namely, trust, social influence, and cost. The results share some common points with that of Chong et al. (2012) in the sense that the three control variables have no effects on intention to use mobile commerce (except that in the study of Chong et al. (2012), age is positively related to intention to use mobile commerce in Malaysia). Table 6 compares the results of this study and that of Chong et al. (2012).

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Table 5. Model B's hypotheses test results

Relationship	Hypothesis	Path Coefficient	t-Value	p-Value	R ²	f ²	Q ²	Results
PEU → IU	H1	0.129	2.129	0.038**	0.479	0.017	0.354	Accept
PU → IU	H2	0.184	3.544	0.001***		0.029		Accept
TRU → IU	H3	0.004	0.069	0.942 ^{ns}		0.000		Reject
VS → IU	H4	0.211	3.998	0.000***		0.048		Accept
SI → IU	H5	0.067	1.309	0.217 ^{ns}		0.005		Reject
TRI → IU	H6	0.297	5.070	0.000***		0.093		Accept
C → IU	H7	-0.045	0.911	0.387 ^{ns}		0.002		Reject
PEU → PU	H8	0.137	2.625	0.012**	0.545	0.022	0.402	Accept
TRU → PU	H9	0.192	3.659	0.000***		0.041		Accept
VS → PU	H10	0.169	3.423	0.001***		0.037		Accept
SI → PU	H11	0.236	4.883	0.000***		0.069		Accept
TRI → PU	H12	0.197	4.079	0.000***		0.051		Accept
C → PU	H13	0.029	0.696	0.468 ^{ns}		0.001		Reject

Notes: IU: intention to use mobile commerce; PEU: perceived ease of use; PU: perceived usefulness; TRU: trust; VS: variety of services; SI: social influence; TRI: trialability; C: cost; *p < 0.010; **p < 0.05; ***p < 0.001; ^{ns}: not statistically significant.

Table 6 shows that the results of this study differ from that of Chong et al. (2012). In the study of Chong et al. (2012), perceived ease of use, perceived usefulness, and trialability do not have direct positive impacts on intention to use mobile commerce in both Malaysia and China, while this study confirms that all these three factors have direct positive impacts on intention to use mobile commerce in Vietnam.

Table 6. This study's results versus that of Chong et al. (2012)

Factors	Malaysia	China	Vietnam
Gender	0.02	-0.05	0.014
Age	0.23**	-0.12	0.085
Education	-0.06	0.04	-0.024
Perceived ease of use	-0.06	0.06	0.129*
Perceived usefulness	0.11	0.02	0.184**
Trust	0.28**	0.53**	0.004
Variety of services	0.51**	-0.01	0.211**
Social influence	0.20**	0.45**	0.067
Trialability	-0.10	0.10	0.297**
Cost	-0.14	-0.14*	-0.045

Note: *p < 0.05, **p < 0.01.

The second difference is that in the study of Chong et al. (2012), trust and social influence have direct positive impacts on intention to use mobile commerce in Malaysia and China, while this study indicates that both these factors have no direct positive impacts on intention to use mobile commerce in Vietnam.

The interesting point is that variety of services has direct positive impacts on intention to use mobile commerce in Malaxia, and this result is shared by the current study. Variety of services does not affect intention to use mobile commerce in China. Moreover, cost does not have impacts on intention to use mobile commerce in both Malaysia and Vietnam, while it has a direct positive effect on intention to use mobile commerce in China.

The unique feature and also the most significant contribution of this study to the literature is that this study analyzes indirect effects of factors on intention to use mobile commerce through perceived usefulness, which was not addressed in the study of Chong et al. (2012) and other studies. Table 7 summarizes the factors' indirect impacts.

Table 7 indicates that trust and social influence have indirect effects (but no direct effects), through perceived usefulness on intention to use mobile commerce. Of note, cost has neither direct nor indirect impacts on intention to use mobile commerce in Vietnam.

Table 7. Indirect impacts on intention to use mobile commerce via perceived usefulness

Six Factors	Perceived Usefulness
Perceived ease of use	0.137*
Trust	0.192**
Variety of services	0.169**
Social influence	0.236**
Trialability	0.197**
Cost	0.029

Note: *p < 0.05, **p < 0.01.

CONCLUSION AND IMPLICATIONS

This study analyzes the factors affecting customers' intention to use mobile commerce in Vietnam. The results show that perceived ease of use, perceived usefulness, variety of services, and trialability all have both direct and indirect positive (via perceived usefulness) impacts on intention to use mobile commerce, while trust and social influence have indirect impacts on intention to use mobile commerce. It is worthnoting that cost does not have any impact on intention to use mobile commerce.

This study should be considered an early attempt at a systematic study on intention to use mobile commerce in Vietnam, a country with a newly emerging economy. Vietnam has a sizeage population and a very high economic growth rate along with high smartphone usage. Moreover, Vietnam's Internet infrastructure in general, and wireless Internet infrastructure in particular, are increasingly improving. However, it is surprising that only 49 percent of businesses receive orders through mobile applications and sales from mobile applications accounts for about 50-60 percent of total revenue. The results of this study may help mobile commerce and telecommunications businesses develop strategies to enhance customers' intention to use mobile commerce in Vietnam.

Intention to Use Mobile Commerce

The study uses Chong's et al. (2012) mobile commerce acceptance model, which has been used in China and Malaysia, countries with similarities to Vietnam. This study shows that perceived ease of use, perceived usefulness, variety of services, and trialability have both direct and indirect (via perceived usefulness) positive impacts on intention to use mobile commerce. Trust and social influence have indirect positive impacts on intention to use mobile commerce via perceived usefulness. Therefore, mobile commerce and telecommunication businesses must develop appropriate strategies to enhance perceived ease of use, perceived usefulness, trust, variety of services, social influence, and trialability to achieve their ultimate goal of improving intention to use mobile commerce in Vietnam.

It should be noted that perceived ease of use and perceived usefulness are two fundamental variables in the TAM model (Pavlou, 2003). These two variables have been confirmed in empirical studies on new information systems or technologies' acceptance/adoption (Bankole et al., 2011). Moreover, empirical evidence has also been found in studies of e-commerce and mobile commerce (Kalinic & Marinkovic, 2016). Therefore, mobile commerce companies and telecommunications companies in Vietnam must work well together to create mobile interface environments with simple and useful applications. Mobile commerce interface environments with these applications should facilitate customers' participation in mobile commerce activities at different levels in simple and convenient ways. Information layout and navigation must be logical, appropriate, simple, and aesthetic so that customers can find relevant information, compare products and services of interest, or make decisions to buy the most preferred products and services. When customers perceive that many benefits can be had by employing mobile commerce without complications, their intention to use mobile commerce will very likely increase.

Trust plays an important role in determining the success of mobile commerce (Malaquias & Hwang, 2016). This study shows that trust indirectly affects customers' intention to use mobile commerce through perceived usefulness. Trust is an important factor in almost all transactions or interactions in economic and social sectors (Pavlou, 2003). Mobile commerce is more uncertain and more risky than e-commerce due to the fact that customers can join mobile commerce at anytime anywhere via wireless Internet-connected mobile devices (Gao & Waechter, 2017). This ubiquitousness coupled with other variables like the nature and type of the devices being used increases the risks associated with customer privacy and security (Luo et al, 2010). In order to bring about customer confidence and increase customer intention to use mobile commerce, mobile commerce companies and telecommunications companies in Vietnam must continuously upgrade their hardware, software and applications with the ultimate goal of protecting customers' personal and financial information, thereby avoiding situations where this information is leaked, stolen, or illegally used. This will require the use of advanced encryption algorithms to help ensure the protection of personal and financial information.

In addition to perceived ease of use, perceived usefulness, and trust, variety of services and trialability also play important roles in influencing intention to use mobile commerce in Vietnam. While within a mobile commerce environment, immediate, convenient transaction and interaction capability can be enjoyed by customers, the variety of services available also must be taken into consideration. Specifically, customers are very likely to participate in mobile commerce when they are provided opportunities to enjoy entertainment services, such as listening to music, watching movies, or playing games on mobile devices (smart phones, tablets, or PDAs). To explore actual customer expectations for such applications, mobile commerce companies and telecommunications companies should provide trialability to customers. Good experiences with free trial services can encourage further use of mobile commerce.

A final important factor that mobile commerce companies and telecommunications companies have to pay attention to is social influence (Afshan & Sharif, 2016). People are surrounded by social rela-

tionships. More specifically, an individual's life is always surrounded by family members, colleagues, friends, and members on social networks (Hsu & Lu, 2004). These people often share their views on life, work and shopping behavior. The views of these people are very likely to affect intention to use mobile commerce. Mobile commerce companies and telecommunications companies in Vietnam must develop appropriate marketing strategies and programs towards different customer groups, including customer groups on social networks. When these customer groups find perceived usefulness, benefits or utilities created by mobile commerce, they will see mobile commerce as an irreversible trend, and in turn, will motivate individuals or team members to participate further in mobile commerce.

LIMITATIONS AND DIRECTIONS FOR FUTURE RESEARCH

Although this study can be considered a systematic investigation into the factors affecting intention to use mobile commerce in Vietnam, there are some limitations that need to be addressed by future studies. First, this study was conducted in Vietnam, a market and culture with its own peculiarities that may limit generalizabilities. Future studies need to be implemented to compare the factors that influence customers' intention to use mobile commerce in other newly emerging countries to have a more complete picture of the level of mobile commerce acceptance/adoption in newly emerging countries around the world. Second, future studies can be conducted to compare the factors' impacts on intention to use mobile commerce in Vietnam and in developed countries to see how widely different any mobile commerce expectations might be between Vietnam and developed countries. Last but not least, the factors identified in this study explain about 48 percent of the variability of intention to use mobile commerce, meaning that there are still other influential factors which were not included in this study's model. These factors should be addressed by future research.

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APPENDIX

Measurement Scales (Adapted From Chong et al., 2012)

Trust:

1. Payments made through mobile commerce will be processed securely.
2. Transactions via mobile commerce are secured.
3. I am confident with the security measurements offered by mobile commerce websites.
4. Privacy on mobile commerce is well protected.
5. I am not worried about providing credit/debit card information for mobile commerce transactions.
6. Mobile commerce is as secure as any e-commerce websites.

Cost:

1. Phone with mobile commerce capabilities is expensive.
2. 3G, 4G, or 5G subscription fee is too expensive for me.
3. Mobile commerce transactions are costly.
4. I will not use mobile commerce because of its costs.
5. I prefer to spend money on other entertainments instead of mobile commerce.

Social influence:

1. Friends and family members have influence on my decision to use mobile commerce.
2. Mass media (e.g. TV, Radio, newspapers, social networks) will influence my decision to use mobile commerce.
3. It is the current trend to use mobile commerce.

Variety of services:

1. The current available mobile commerce services/applications are attractive to me.
2. There are many mobile commerce services/applications that meet my needs.
3. Current mobile commerce services/applications are up to my expectations.

Perceived usefulness:

1. Mobile commerce allows me to improve my work productivity.
2. Mobile banking is much more convenient than e-banking.
3. I find that mobile commerce is more convenient than e-commerce.
4. Entertainments offered by mobile commerce are better and more convenient than personal computer based Internet.

Perceived ease of use:

1. It is easy to use mobile commerce.
2. I know how to use GPRS, 3G, 4G, or 5G.
3. Using mobile commerce requires minimum efforts.
4. I am able to use mobile banking, connect to location based services, purchase products/services easily.

Trialability:

1. I would like to know more about mobile commerce before using it.
2. Have free access to mobile commerce applications for a month might convince me to use it.
3. Trial access to 3G, 4G or 5G might convince me to subscribe to 3G, 4G, or 5G and use mobile commerce.

Intention to use mobile commerce:

1. I will use mobile commerce in the near future.
2. I will purchase mobile commerce enabled phones in the near future.
3. I am currently using mobile commerce frequently.

Chapter 28

Mobile Financial Services in Developing Countries: The Impact on Consumer Financial Behaviour

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ABSTRACT

This chapter describes how mobile technologies have recently emerged as the new wave in Information Technology revolution and are constantly gaining importance and popularity in nearly every avenue of our working and social lives. One area of mobile technology that has become a focus in recent times is the use of mobile devices particularly the mobile phones for an array of financial services. Mobile financial services and their massive adoption and rapid spread in the developing world, has deepened investments in mobile infrastructure and has further contributed to financial inclusion and economic development. Their adoption, in particular, has had a significant impact on consumer financial behaviour. This chapter builds on a rich body of literature available to highlight the impact of mobile financial services on consumer financial behaviour and the implications for financial institutions.

INTRODUCTION

Mobile technologies have recently emerged as the new wave in Information Technology (IT) revolution and are constantly gaining importance and popularity in nearly every avenue of our working and social lives. There is vast global interest in the role that mobile technologies can play in social and economic development. Mobile phones, in particular, are now the technology of everyday life and their uses are certainly indispensable. As a convergence technology, mobile phones constitute multi-media devices that can perform multiple communicative functions. People around the world are using their mobile phones for a variety of purposes, such as making calls, sending short text messages, sending and retrieving e-mails, web browsing and retrieving documents.

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The adoption and widespread use of mobile phones globally has been experienced as the most significant growth of consumer level technology (Merritt, 2010; Hinson, 2011). By the end of 2015, the total number of mobile phones in use stood at 7.6 billion, representing an estimated 4.6 billion mobile subscribers worldwide (Groupe Speciale Mobile Association [GSMA], 2015). Of the 4.6 billion mobile subscribers, 3.7 billion subscribers were located in low and middle-income economies. In the developing world the number of mobile-broadband subscriptions is increasingly growing: more than 90% of the incremental 1 billion new mobile subscribers forecast by 2020 will come from developing markets (GSMA, 2016).

The ubiquity of mobile phones and other mobile devices in our societies and the continued growth of mobile phone penetration in particular have had a significant social and economic impact. One area of mobile technologies that has become a focus in recent times is the use of mobile devices particularly the mobile phones for an array of financial services including mobile banking and other micropayment solutions. Accordingly, traditional payment providers are now moving aggressively into mobile payment space and also consumers' access to financial services is evolving.

Mobile financial services have established a clear and emerging new channel in the space of banking and payments (Pegueros, 2012). Mobile devices provide a new channel for banking, payments and transfers with greater reach than traditional bricks and mortar locations. Many people are using mobile devices for a range of financial transactions, such as receiving and sending money transfers. The increasing use of mobile technologies to access financial services has the potential to affect consumer finances and consumer behaviour.

This chapter builds on a rich body of literature available to highlight the impact of mobile financial services on consumer financial behaviour and the implications for financial institutions. Specifically, the chapter compares consumers' financial behaviours before and after the advent of mobile financial services.

BACKGROUND

Mobile phones have increasingly become tools that consumers use to interact with their financial institutions, make payments and manage their personal finance. Consumers are using mobile financial services more and more to access accounts, pay bills, pay tuition fees, deposit funds and manage their financial lives (Maree, Piontak, Omwansa, Shinyekwa & Njenga, 2013). Mobile financial services in developing countries help low-income, unbanked; under banked and economically vulnerable consumers achieve their financial goals.

This section provides an overview and the background of mobile financial services and is divided into three main parts. The first part introduces the concepts related to mobile financial services. The second part provides an overview of its trends and status in developing countries, drawing primarily on information from a few selected countries. The next part discusses how mobile financial services have become successful in the developing countries highlighting on factors that made the services successful.

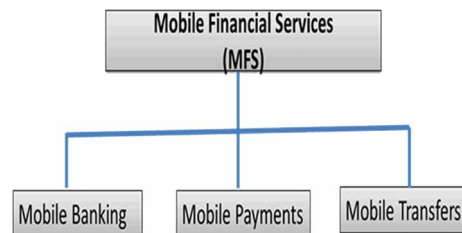
Mobile Financial Services: What Are They?

The term "mobile financial services" (MFS) also known as mobile money services (MMS) refers to financial transaction services through mobile devices such as mobile phones or tablets. Mobile financial services may be provided by mobile network operators (MNOs), as well as by banks and other provid-

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ers that use the MNOs' network (Kumar, McKay & Rotman, 2010). Ledgerwood, Earne and Nelson (2013) assert that "NMOs provide the ability to use mobile phones for financial services-either directly to consumers or on behalf of other financial service providers, usually through an agent network" (p. 4). The mobile financial services ecosystem encompasses a wide range of financial activities that consumers engage in or access using their mobile devices. MFS as shown in Figure 1 can be divided into three major categories: mobile banking, mobile payments and mobile transfers.

Figure 1. Mobile financial services



Mobile banking refers to provision of banking and financial services with the help of mobile telecommunication devices (Chandran, 2014). From a user perspective, mobile banking services are only available to people who possess a formal bank account. Like automated teller machine (ATM) services, mobile banking services allow consumers to access account information and perform transactions without requiring physical access to bank branches. Mobile banking allows consumers to use their mobile phones as another channel for their banking services such as deposits, withdrawals, account transfers, bill payments and balance inquiry. Consumers are able to perform banking transactions from anywhere and anytime. This facility avoids the time spent travelling to a branch and standing in queues. However, there are usually daily mobile banking limits per business day, making it necessary to visit the bank branch.

Mobile payment (also commonly referred to as m-payment) refers to a noncash form of payment service performed via a mobile device (Cheney, 2008). It describes the use of a mobile device, usually a mobile phone to make payments for goods and/or services. In this case, an electronic account (mobile wallet) linked to the SIM card in the mobile phone is used instead of cash. This electronic account is protected by a personal identification number (PIN), with accounts debited or credited as soon as the transaction takes place. To transact, mobile phone users need to deposit cash into their mobile wallet at the outlet of an agent of a local mobile telecommunications company (Subia & Nicole, 2014).

From a location perspective, mobile payments generally fall into two categories: proximity payment and remote payment. Mobile proximity payment describes the payment initiated from a mobile device at a point of sale (POS), such as a grocery store, gas station or supermarket. This method requires the mobile phone to make contact with a payment terminal (or other hardware) in the immediate vicinity. Near Field Communication (NFC) is the best-known proximity technology. It consists of a small antenna within a smartphone that allows bi-directional communication with NFC readers (contactless POS) to perform contactless payment transactions. Today, the vast majority of new smartphones are equipped with a NFC chip.

Mobile "remote payment," on the other hand, can be performed independently of the mobile phone's location. This method requires payments to be initiated and settled through the mobile cellular phone

network in combination with an associated payment network. The necessary software resides online or within an app which enables the user to make online purchases. One of the best-known providers of this type of payment is PayPal. Remote mobile payments include transactions with a remote merchant through a mobile device. For example, payments for airtime top up and utility bills, purchase of ring tones and games can be undertaken without interacting directly with the merchant.

In many developing countries, mobile payments have gained traction because many consumers lack access to other noncash forms of payments such as credit cards or checks (Hayashi, 2012). Thus, mobile payments have been adopted as a convenient way of paying for such services as utility and airtime top up.

Mobile money transfer in this paper refers mainly to a financial service that allows unbanked people to send or receive money to/from any other mobile phone user. The transfer can be domestic or international and can also be called a “peer to peer” (P2P) transfer. When the transfer is international, it is referred to as an international remittance.

Mobile Financial Services Trends in Developing Countries

When it comes to technology-driven financial solutions, developing countries leapfrog ahead of developed countries (Popper, 2015). The best-known fact about mobile financial services is their massive adoption and rapid spread in the developing world. Research from the GSMA (2015) reports that approximately 255 mobile money services deployed in 89 countries globally in 2014 were accessible in more than 60 percent of developing markets.

In the majority of developing countries, mobile money accounts exceed bank accounts (GSMA, 2015). One study for example, found a sharp increase in the number of active mobile money accounts in 2014, where in East Africa one in two connections was linked to a mobile money account (Scharwatt, Katakam, Frydrych, Murphy & Naghavi, 2014). In East Africa alone, it was predicted that an additional 16 million new mobile money accounts would be opened in 2015. At the end of 2013, there were already more registered mobile money accounts than banks accounts in Cameroon, the Democratic Republic of the Congo, Gabon, Kenya, Madagascar, Tanzania, Uganda, Zambia and Zimbabwe. In 2014, Burundi, Guinea, Lesotho, Paraguay, Rwanda, the Republic of the Congo and Swaziland passed this threshold, bringing it to a total of 16 countries (GSMA, 2015).

Mobile financial services have been an invention bringing financial services to millions of previously unbanked and underbanked people around the world, making this industry a key enabler of financial inclusion (GSMA, 2015). The frequently cited region where mobile financial services are most widely spread is Sub Saharan Africa followed by Southeast Asia and Latin America (Runde, 2015).

The Philippines is among the countries where mobile money services have successfully reached a sustainable scale. It was one of the earliest adopters of mobile money services when SMART Communications in partnership with Banco de Oro launched SMART Money in 2001. The service enables customers to send and receive Smart Money domestically and internationally buy airtime, send and receive money domestically and internationally, and pay for goods using a card. In 2004, Globe Telecom launched GCASH, an SMS-based offering, which provides a cashless method for facilitating money remittances, settle loans, disburse salaries or commissions and pay bills, products and services via text message (Lal & Sachdev, 2015).

M-Pesa, first launched in 2007 in Kenya, was one of the first systems to embrace mobile financial services in East Africa and its impact has brought mobile money services to international prominence. Developed by telecom giants Vodafone and Safaricom with the blessing of the Central Bank of Kenya,

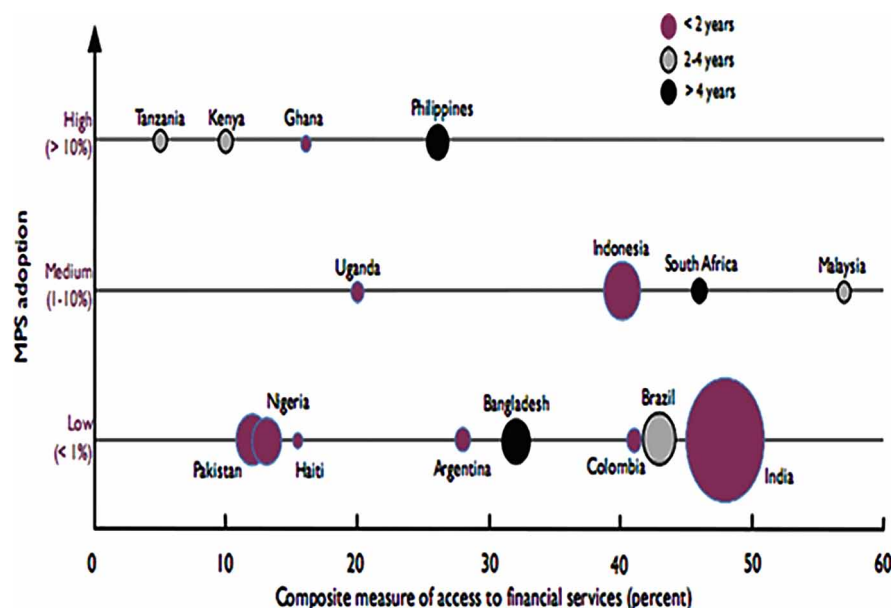
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M-Pesa represents the gold standard for innovative financial services. Using data preloaded on the SIM card, M-Pesa utilizes a SMS based interface to transmit money virtually to other phones. The system allows users to store money on their mobiles and transfer the amount via text message to anyone who owns a mobile phone. The operation is cheap, convenient and safe allowing millions of unbanked and under-banked people to gain financial inclusion.

Kenya has been a leader in the adoption of mobile financial service and M-Pesa is often considered the most successful mobile money service in the developing world. According to Safaricom, M-Pesa has been intricately merged into the daily life of Kenyans, rich and poor, rural and urban. It is rare to find a person in Kenya who is not aware of M-Pesa. Over 18 million Kenyans, equivalent to more than two-thirds of the adult population use the M-Pesa services (di Castri, 2013). Between 2008 and 2011, M-Pesa grew at 88% annually (Deb, & Kubzansky, 2012). In 2014, the service processed over \$20 billion in transactions, a figure equal to more than 40% of the nation's GDP. Nearly a decade after its launch, M-Pesa has transformed economic interaction in Kenya. Its success reshaped Kenya's banking and telecom sectors, extended financial inclusion for nearly 20 million Kenyans, and facilitated the creation of thousands of small businesses. M-Pesa has been especially successful in reaching low-income Kenyans: new data indicates that the percentage of people living on less than \$1.25 a day who use M-Pesa rose from less than 20 percent in 2008 to 72 percent by 2011.

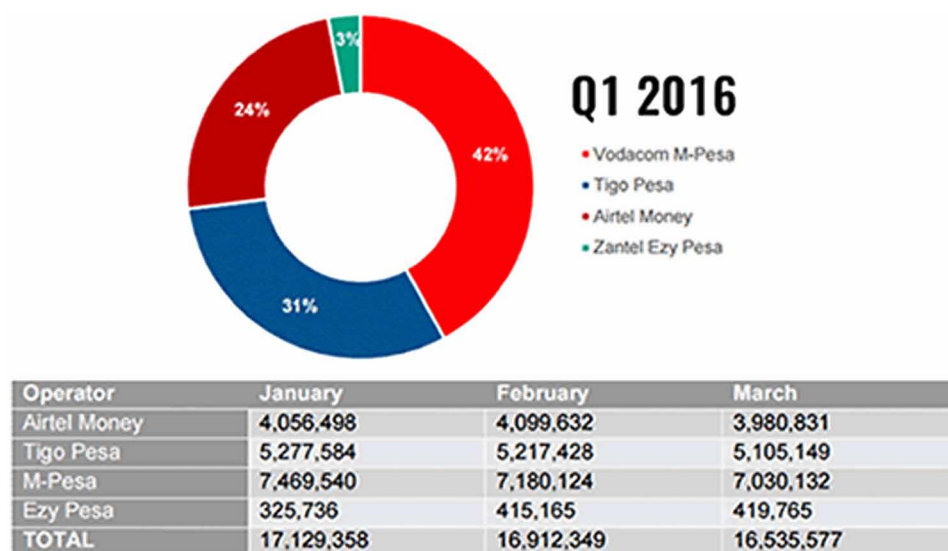
M-Pesa has become the benchmark for successful mobile money launches and operations such that new mobile financial service operators seek to emulate the success. M-Pesa's success in Kenya has prompted new players to launch similar services in many emerging markets. Today there are a number of successful mobile money services around the world that are similar to or resultant from M-Pesa. A few of the other most successful examples include Tanzania and Ghana which by 2013 had achieved more than 10% of adoption of mobile financial services among their population (Gupta, 2013) (see Figure 2).

Figure 2. Adoption of mobile financial services in emerging markets
Gupta, 2013.



Tanzania offers another example of the most advanced mobile money markets in the world representing almost a third of all of East Africa’s active mobile money accounts in 2015 (GSMA, 2015). According to GSMA (2015), by 2015 there were four mobile money providers in the country: Vodacom with M-Pesa (42% market share), Tigo Pesa (31%), Airtel with Airtel Money (24%), and Zantel with Ezy Pesa (3%) (see Figure 3). M-Pesa was first introduced in Tanzania in 2008, in 2008 followed by Zain with Zap Money (now Airtel Money), Zantel with Z-Pesa (now EzyPesa) in 2009 and Tigo with Tigo-Pesa in 2010. In 2016, Halotel became the fifth mobile money provider in Tanzania with Halo Pesa.

Figure 3. Tanzania mobile money accounts and market share by provider
GSMA, 2016.



Mobile money has seen impressive growth since its launch in 2008. By the fourth quarter of the year 2016, the number of Tanzanians with mobile money account stood at 18 million (35% of the population) making its penetration rates reach 67%, according to the Tanzania Communications Regulatory Authority (TCRA). Since the launch of mobile money in 2008, over 40m mobile money accounts have been registered making 95m mobile money transactions per month in total, transacting an average of USD1.6b per month

In addition to mobile money services, mobile operators in Tanzania offer other mobile financial services such as financing and micro financing services, and mobile insurance. In 2012, Tigo launched Tanzania’s first mobile insurance service, Tigo Bima, offering life and hospitalization cover. Tigo customers, both in Tanzania and Rwanda, were also the first ever to use an international mobile money transfer service with instant currency conversion.

MNOs in Tanzania have managed to interconnect their services with one another making Tanzania emerge as the first country in the world to achieve full interoperability. In December 2014, Tigo connected with Zantel, and in February 2016, Vodacom announced connecting with Airtel and Tigo. International interoperability has also been a reality in Tanzania through the partnerships of mobile money operators with international money transfer services like MoneyGram and Western Union. Vodacom Tanzania

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also allows for operator-to-operator international money transfer interoperability through its partnerships with Safaricom in Kenya.

Ghana is another country whose economy has been reshaped by mobile money services. Telcom Company MTN Ghana was the first company to introduce mobile financial services in Ghana in July 2009. It called it MTN Mobile Money, followed by Tigo with Tigo Cash and Airtel with Airtel Money (Wemakor, 2014).

The mobile financial services industry has created jobs for the mobile money agents, service providers and users including Fintech companies, merchants, retailers, and aggregators (Bank of Ghana, 2017). At the end of December, 2016, the number of mobile money agents stood at 107, 415; with MTN mobile money contributing 54.0 per cent, TIGO Cash 24.9 per cent, Airtel Money 11.0 per cent and Vodafone Cash 10.1 per cent (Bank of Ghana, 2017).

Why Are Mobile Financial Services So Successful in Developing Countries?

Successful implementation of any transformation initiative starts with a question ‘what problem can I solve?’ This has been apparently the case for the success of mobile money services in developing countries. The circumstance to meet financial needs of low income and financially underserved consumers has been the key success factor of mobile financial services in developing countries. For many people in developing countries, access to financial services at formal financial institutions is very limited, resulting in traditional “bricks and mortar” financial institutions to struggle to provide convenient, safe and affordable financial services to the underserved customers, thereby increasing financial inclusion, particularly in rural areas (Scharwatt et al., 2014). According to Scharwatt et al. (2014), of 2.5 billion people in developing countries who are ‘unbanked’, approximately one billion of these people have access to a mobile phone, which can provide the basis for extending the reach of financial services such as payments, transfers, insurance, savings, and credit. Hence, mobile phones have a perfect vehicle, given their widespread adoption, even among the low-income earners.

Most of the financially underserved populations live in developing countries. In developing countries, 2.5 billion people are ‘unbanked’ and have to rely on cash or informal financial services which are typically unsafe, inconvenient and expensive (Scharwatt, Katakam, Frydrych, Murphy & Naghavi, 2014). By 2015, more than 270 mobile-money services were operating in 93 countries, with an estimated 411 million accounts (Rob, 2016). In this context, mobile financial services constitute an opportunity for the financial inclusion of the poor. Based on the current rate of access to mobile phones, the Tanzanian market shows potential for further m-money adoption. According to the first annual FITS survey conducted in 2012, it was found that 56% of households in Tanzania own at least one active SIM card which is required for opening an m-money account.

THE IMPACT OF MOBILE FINANCIAL SERVICES ON CONSUMERS’ FINANCIAL BEHAVIOUR

The increasing use of mobile technologies to access financial services over the past few years has been the major development in the consumer financial services market (Consumer Financial Protection Bureau [CFBP], 2015). Mobile financial services have not only offered conveniences and security for transfers and payments but also have had a significant impact on people’s financial behaviours. Since the mobile

financial services took hold in the late 2000's, various consumers' financial practices have changed significantly (GSMA, 2015). Studies of the impact of mobile financial services on the consumers' financial behaviour have just started to emerge. This section highlights the impact of mobile financial services on various behavioural categories such as saving habits, budgeting, interactions with financial institutions, insurance, receiving and sending remittances, spending and purchase behaviour

A number of key findings emerging from various studies indicate that mobile financial services have increased the capacity of low-income earners to save. According to a study conducted by Nandhi (2012) in India, the ability to save has improved for a majority of users through EKO¹ mobile banking by comparison to earlier practices such as keeping cash on hand. With EKO's mobile banking, the majority of low income users in the study (95 per cent) consider EKO mobile money accounts as a preferred alternative over other forms of savings (Nandhi, 2012). Basically, convenience, security of savings, efficiency of transactions, reliability, flexibility, safety, secrecy, promptness of agent servicing were some of the main reasons why EKO mobile banking was considered as a good substitute.

In another study conducted by Sangaré and Guérin (2013) in Mali to assess the potential of mobile banking in favour of financial inclusion in a context where access to formal finance is limited, the impact of mobile banking on users' saving practices was revealed. The mobile wallet allows users to keep aside a surplus of money to deal with unexpected expenses or payments in a context of higher income uncertainty and volatility. 39% of the surveyed population affirms noting a rise in their savings due to the use of a mobile account (Sangaré & Guérin, 2013)

One of the most recent studies was conducted by Wamuyu (2016) to investigate the potential of using mobile money accounts as a money management platform that can help promote a savings culture among poor households in Kenya. The study examined innovative ways in which poor households could use mobile money accounts as a tool for financial inclusion, achieving household financial security, and enhancing family role performance. This was based on the premises that 41% of Kenyans are low income earners and thus they do not save regularly.

The study found that over the years Kenyans, particularly low-income earners; have been saving their money in rotating savings and credit associations of which most of them are informal. In many households, saving was mostly as cash under the mattress. With mobile lock savings accounts, mobile money savings have influenced welfare of many households by providing a chance to save money for a defined purpose and for a specified amount of time hence reducing chances of misusing the money. In many Kenyan families living in slums, most fathers are alcoholic and may not fulfil their family roles. Thus, with a mobile money fixed deposit savings accounts, it is now possible to have fathers locking the money they do not intend to use before going to his drinking location. This allows this parent to have finances to meet his family obligations.

As is the case with savings, mobile devices have increasingly become new tools consumers use for budgeting. Mobile phones have started to be utilized as personal financial management tools. Some people are using mobile devices to manage their finances. It is realized that many mobile banking users use their mobile phones to check account balances or available credit before making a large purchase. Furthermore, some mobile phones not only allow their users to access financial accounts but also to track purchases and expenses. It is known fact that consumers can take advantage of other applications on their mobile phones, such as text alerts, to make smarter financial decisions. For example, the low balance alerts provided by banks are an effective tool for encouraging consumers to engage in better financial behaviours. A good lesson is learnt from the U.S where one-third of mobile banking users indicate that they receive text message alerts from their bank and, out of this group, 66% receive "low-

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balance alerts”. Nearly all report taking some action in response to getting a low-balance text alert from their bank: transferring money into the account with the low-balance (58%), reducing their spending (41%), or depositing additional money into the account (16%) (The Federal Reserve Board, 2013). This suggests that mobile users are less likely to incur overdraft and credit card penalty fees.

Additionally, the emergence of mobile financial services has affected consumers’ interaction with their financial institutions (GSMA, 2016). Mobile financial services offer self-service options that enhance the customer experience by making it easier for consumers to interact with their financial institutions regardless of time or location. Today mobile devices have become companions of consumers’ mobility such that interaction with mobile phone represents a significant part of the time spent by the mobile phone users. As a result, customers are noticeably spending less time visiting bank branches. Traditionally, customers used to visit physical banking institutions two or three times as frequently as mobile or online banking customers. Nowadays many customers visit physical banking facilities rarely, conducting the majority of their banking transactions such as paying bills, checking balances, or making transfers on their mobile devices. The main reasons that bank clients still visit bank branches are to withdraw cash, deposit money into their bank account, change money into different currencies, make international transfers and for financial consulting. As facilities for mobile payment in retail continue to spread, we can expect to see the number of cash withdrawal visits shrink over time. This interactive nature of mobile banking implies that financial institutions should develop a strategic “digital” or “mobile” plan, and consider mobile as their key infrastructure platform for service delivery.

When it comes to sending or receiving remittances, mobile money is perceived as a gamechanger. In most developing countries a great number of households depend on domestic remittances. An increase in urbanisation in city centres and persistent rural-urban migration means that the need for money transfer services has been quite significant. The impact of mobile money transfer is especially important for poor people in rural areas for whom traditional banks and related financial services are often inaccessible. Until recently, without access to mobile money services, cash could be sent through persons travelling to the destination, such as bus or truck drivers, but such informal mechanism was risky. Other methods of remittances were using visiting family and friends or traveling long distances to remit the funds whenever necessary. Armed robbery, theft and accidents are a few of the challenges with these methods of remittance. Due to its reliability, mobile money is now the main avenue for sending and receiving remittances in many developing countries (Jack & Suri, 2011; Morawczynski, 2009; Mirzoyants, 2013). Rural householdes in developing countries are more likely to receive remittances from their distant relatives and friends through mobile money technology (Kikulwe, 2014). Equally, urban households with relatives in rural areas use mobile money services more frequently.

Another fruitful pathway of how mobile money services affect financial behaviour is through the possibility of using mobile money to create informal insurance. The poor are at risk of multiple communal shocks including natural disasters, conflicts, illness, deaths and theft. To insure against these risks, family, clan and network ties can create informal insurance networks, spreading risk by periodic transfers and monitored by trust relationships amongst members of the network (De Weerd & Dercon 2006). The mobile money technology allows small and more frequent transfers of money that make for a more flexible management of negative shocks. Thus, informal insurance networks may function more effectively. In turn, more efficient investment decisions can be made, improving the risk and return trade off.

Mobile money technology has also had an impact on the consumers spending behaviours. A handful of studies suggest that the mode of payment affects perceptions of money and spending behaviour (Vandoros, 2013; Raghubir & Srivastava, 2009; Chatterjee & Rose, 2012; Raghubir & Srivastava, 2008).

Cobla, Assibey and Asante (2015) conducted a study at the University of Ghana to investigate how the use of the mobile money technology among students affects their spending behaviour. The findings of the study revealed that on a monthly basis, students who use mobile money technology spend nearly 19 Ghana Cedis more than their colleagues who do not use mobile money. Likewise, while studying university students from Jordan, Smadi and Al-jawazneh (2011) noted that students using mobile technology spend more cash in impulse purchase. This is the fact that mobile money facilitates access to funds at any point in time and thus the purchaser would easily make un-planned purchase. This is based on the notion that payments by cash is memorable and painful and that electronic transfers are less so.

CONCLUSION

The overall objective of this chapter was to highlight the impact of mobile financial services on consumer financial behaviour and the implications for financial institutions. The findings from the literature have uncovered some interesting facts about the consumers' financial practices. The chapter reports that mobile financial services have been well established in the majority of developing countries. Mobile financial services have become a core offering for many mobile network operators in developing countries, deepening investments in mobile infrastructure and further contributing to financial inclusion and economic development. Their adoption, in particular, has had a significant impact on various behavioural categories such as saving habits, budgeting, interactions with financial institutions, insurance, receiving and sending remittances, spending and purchase behaviour. Mobile financial services have increased the capacity of low-income users to save. On the other hand, mobile financial services have reduced physical visits and face-to-face interactions with financial institutions. Nowadays, customers are less dependent on bank branches for services such as paying bills, checking balances, or making transfers as these can be carried out easily using online banking from home and are becoming more widely available as mobile services.

In essence, mobile money technology has the potential to lift people in developing countries out of poverty. As mobile financial services continue expanding the opportunities for financial inclusion, they raise the need for financial institutions and MNOs to pursue more synergistic operating models to develop a wider range of financial services that can be extended to more mobile users. Interoperability and more product lines beyond transfers and payments will help to enhance the customer experience by making it easier for consumers and businesses to access more financial services. Further partnerships will increase the volumes of international remittances being conducted via mobile money in while driving down the cost for senders. In addition, more proactive policies are required to ensure that the market can continue to grow and serve local consumers. The obstacles prevailing in some markets should be overcome in order for mobile financial services to reach more people and achieve the scale to which it aspires.

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KEY TERMS AND DEFINITIONS

Financial Behaviour: Financial management practices such as savings, budgeting, investing, and insurance, credit, cash, and spending and purchase behaviour.

Financial Inclusion: Delivery of delivery of financial services at affordable costs to disadvantaged and low-income groups of society. Financial inclusion initiatives seek to ensure that all households and businesses, regardless of income level, have access to and can effectively use the appropriate financial services they need to improve their lives. Individuals who are financially included are able to make day-to-day transactions, including sending and receiving money; safeguard savings, which can help households manage cash flow spikes, smooth consumption and build working capital; finance their small businesses or microenterprises; plan and pay for recurring expenses, such as school fees; mitigate shocks and manage expenses related to unexpected events such as medical emergencies, a death in the family, theft, or natural disasters; and improve their overall welfare.

Interoperability: A term describing the interconnection that allows transactions to flow across diverse payment systems. With regard to mobile financial services, that would mean transfer of money between mobile money accounts or mobile money and bank accounts, both domestically and internationally. One example of interoperability is the interconnection between m-Pesa and MTN Mobile Money in East Africa. In this case, customers of M-Pesa and MTN Mobile Money are able to transfer money to each other following an agreement between Vodafone Group and MTN Group to interconnect their mobile money services. This interconnection between the two mobile money operators enable convenient and affordable international remittances between M-Pesa customers in Kenya, Tanzania, Democratic Republic of Congo and Mozambique, and MTN Mobile Money customers in Uganda, Rwanda and Zambia.

Mobile Lock Savings Account: A savings account that allows mobile money customers to save for a defined purpose and for a specified period of time. The funds saved on the mobile lock savings account will be kept in the account until the maturity date.

Mobile Technology: Technology that allows tasks to be performed via portable electronic devices particularly the cellular phones. It includes the use of a variety of transmission media such as: radio wave, microwave, infra-red, GPS and Bluetooth to allow for the transfer of data via voice, text, video, 2-dimensional barcodes, etc.

Mobile Wallet: Type of mobile technology that allows businesses and individuals to receive and send money via mobile devices. An individual holds such items as credit and debit cards, medical records and all of the items that a physical wallet would carry on his/her mobile device.

Remittances: Money sent home in form of wire transfer or cash or cheques by relatives or friends working abroad or in urban areas. In developing, where people leave their home to make a new life for themselves in another other country or urban areas, the families left behind may not able to support themselves without some assistance. Support for the families will generally fall on the one (or more) person sent abroad, with the family dependent on remittances being sent back to them.

ENDNOTE

- ¹ EKO is a financial service start-up company offering mobile money services in India through partnership with the State Bank of India (SBI). It partners with a network of agents—chemists, grocers, airtime vendors—to provide banking services to people with no access to formal bank accounts.

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Chapter 29

Enablers and Inhibitors of Merchant Adoption of Mobile Payments: A Developing Country Perspective

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ABSTRACT

Merchant adoption of mobile payments is facilitating new business models and changing the way merchants run their brick and mortar businesses. Despite the advantages of mobile payment adoption to the merchant, they still hesitate to adopt mobile payments. Thus, the study seeks to explore qualitatively through a case study the enablers and inhibitors to merchant adoption of mobile payments. The study identified that merchants are adopting mobile payments to facilitate new business models, to promote the disintermediation of traditional intermediaries, to offer different possibilities of growing their businesses, and to reduce transaction costs. Even though merchants believe that mobile payments adoption and use improve operational efficiency to their businesses, there are instances of fraud, particularly in the peer-to-peer transfer sector, data breaches, data security, and privacy concerns. Therefore, it is imperative for service providers of mobile payments to enhance technological issues regarding privacy protection that could enhance trust towards mobile payment adoption.

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INTRODUCTION

The liberalisation of ICT in developing countries in the past decade has brought a considerable transformation to the macro and micro-economic landscape of developing countries. Through the provision of technical support, interactive network, and service to underserved sectors such as health and finance (Asongu, Nwachukwu, & Orim, 2018; Murphy & Carmody, 2017). More so, mobile phones are receiving attention globally; as a result, developing economies have gradually seen an expansion in mobile phones used to facilitate different services. Prominent among these services is using the mobile phone in payment transactions known as mobile payment (Dahlberg, Guo, & Ondrus, 2015; Iman, 2018). The mobile payment revolution has been transforming households and businesses by providing a business solution to small and medium-sized businesses as well as mobile phone-related financial services to the underserved population in developing countries (Asongu et al., 2018). Also, the deployment of mobile payments is an avenue to help developing economies leapfrog poor non-existing payment infrastructure, which is seen as a burden to economic growth in these countries. This lack of quality means of payment is an opportunity to open a high window of m-payments for future use in developing countries (Asongu & Boateng, 2018). Mthobi and Grzybowski (2017) report that the availability and access to mobile payment dramatically improve the standard of living, and provide potential mechanisms to steer economic benefits to consumers and producers in developing countries. For instance, it can increase market efficiency by improving and facilitating services which in general are not available to low-income households, such as mobile phone-based financial services (Aker & Mbiti, 2010).

This innovation has been swiftly accepted in developing countries by leading the way as a critical driver of economic growth and better financial access to reduce economic vulnerability and increase investment in human capital (Asongu & Boateng, 2018; Humbani & Wiese, 2018). Different authors have outlined the importance of mobile payment as creating distinct value to both merchants and consumers and is considered as one most essential success driver of mobile commerce (Liébana-Cabanillas, De Luna, & Montoro-Ríos, 2015; Asongu & Boateng, 2018). Arguably this innovation suggests a significant advantage for merchants. However, aligning the high penetration of mobile phones and the low level of mobile payment adoption by merchants continues to challenge mobile payment researchers and practitioners globally. This seems to defeat the usefulness of mobile payments, and yet it has not been explored (Dahlberg et al., 2015; Slade, Dwivedi, Piercy, & Williams, 2015). Therefore, the reason for non-adoption by merchants is not firmly established. This suggests the need for mobile payment providers to understand the enablers and inhibitors of merchant adoption and use of mobile payments to design strategies and develop their marketing tools to suit the needs of merchants.

Nevertheless, the literature on mobile payments has explored and conceptualized the benefits and challenges of mobile payment, technical dimensions that affect consumer intentions to adopt mobile payments (Jin, Zheng, Jin, & Li, 2017; Liébana-cabanillas & Lara-rubio, 2017; Madan & Yadav, 2016; Miao & Jayakar, 2016). These studies are often silent on merchants' adoption and perceptions about the maturity of mobile payment technology as a means of payment transactions and, the preparedness of merchants to adopt mobile payment to their benefit (Cabanillas et al., 2017; Mallat, Rossi, Tuunainen & Oorni, 2006; Pousttchi, 2008). Secondly, mobile payment failures have a secure connection to the lack of critical mass of users as well as having limited adoption of merchants and non-involvement of merchants (Dahlberg et al., 2015). Nevertheless, existing studies on mobile payment fail to provide a comprehensive explanation of the merchant's role in the growth and development of mobile payment ecosystem, and the resources needed to develop and establish a sustainable two-sided market that generates critical

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mass for mobile payment adoption (Guo & Bouwman, 2015). More importantly, context-specific issues, varying cultural and market restrictions such as economic, technology, and social dynamics do not allow successful business models to be imported directly to another cultural context. Therefore, examining the merchant's mobile payment adoption in the developing country context where minimal research has been conducted, is also essential.

This chapter will depend on the explanatory power of Diffusion Innovation Theory and Perceived Technology Security to explore factors that could impact the adoption of mobile payment by merchants. Therefore, the purpose of this study is to explore the enablers and inhibitors of merchant adoption of mobile payment from a developing country perspective. The chapter will seek to respond to the questions: what are the enablers of merchant adoption of mobile payments in Ghana and what are the inhibitors of merchant adoption in Ghana. The study will adopt a qualitative method to explore the subject under study. The remainder of this chapter is organised as follows: The next section reviews the literature on mobile payments and briefly discusses the theoretical underpinnings. The third section presents the conceptual framework guiding the study; the section that follows details the methodology employed for the study. Subsequently, the findings are analysed, and discussions of the findings presented. Finally, the chapter concludes with specific contributions and directions for future research.

LITERATURE REVIEW

Mobile Payments Conceptualisation

Mobile payment is regarded conceptually, as a novel form of value transfer, comparable to other payments; nevertheless, the distinction is the use of mobile devices as a medium. Mobile payments as a concept has been defined from different perspective in the literature. Different researchers like (Liu, Kauffman & Ma 2015; Dahlberg, 2015; de Reuver et al., 2014; Au & Kauffman, 2008; Dahlberg et al., 2008 ; Dewan & Chen, 2005) have explained mobile payments from the technical angle thus considering mobile payments as making payment with the assistance of technology through a mobile device. However, a researcher like Zhong 2009 views mobile payment as having strategic, participatory and operational functions. Also, Upadhyay and Chattopadhyay (2015) and Mallat (2007) looked at mobile payments (M-payment) as an m-commerce sub-set, which offers a technique for conducting practical and innovative micropayment to facilitate mobile commerce transactions through non-banking channels. In this paper, mobile payment is defined as an exchange of value with the assistance of mobile devices (mobile phones, smartphone Personal Digital Assistant or any wireless device) to securely complete a transaction over a mobile network or via various wireless technologies within the mobile payment's ecosystem. Mobile payment technology has been categorised mainly into two by the literature; remote payments and proximity payments (Agarwal, Khapra, Menezes, & Uchat, 2007). Mobile payment via SMS, direct billing, entering bank account number on a mobile website, registering on merchant's website such as Amazon and using an electronic wallet are classified as remote payment. On the other hand, the scenario where the user can integrate mobile phones or mobile device contactless facilitated by Near Field, Communication (NFC) where the user can make payment as the individual passes the mobile next to the receiving terminal is known as proximity payments, this is common in the public transport industry (Tylor, 2016; Zhao & Kurnia, 2014). Mobile payment can further be differentiated based on the transaction; into peer to peer payments, consumer to business payments and business to business payments. Further, the providers of

mobile payments can also be analysed from three perspectives, that is mobile network operator-centric, financial institution and the third-party operators (Zhao & Kurnia, 2014).

Prior Research on Mobile Payment

Mobile payment adoption has received much attention in the literature; the reason is that researchers have bemoaned the lack of widespread adoption of mobile payment against the prediction and hype of mobile payment usage (Williams, Roderick, Davies & Clements, 2017). For example, in North America, 52% of the population know about mobile payments, but only 18% are patronising mobile payments on a routine basis (Silbert, 2015). In comparison to similar areas of research such as e-commerce, internet banking or mobile banking, where research has been extensively conducted, mobile payment is a relatively new area of research and underexplored. As such, some researchers view mobile payment research to be in its developing stages (Slade et al., 2013). Despite mobile payment research being in its infancy, the technology supporting mobile payment systems has grown dramatically, due to the diffusion of mobile phones and smart devices. Even though, the number of studies increased in the last couple of years very few analyzed the adoption of mobile payments from the merchant perspective (Leong et al., 2013; Slade, Williams, Dwivedi, & Piercy, 2016; Tan, Ooi, Chong, & Hew, 2014). Hence mobile payment research conducted from the perspective of the merchant is not fully matured (Li, 2018).

In Ghana, research focusing on merchant adoption is scarce, irrespective of the potential benefits of mobile payment adoption to the merchant. In Ghana, literature has fairly covered mobile payment use and adoption, among the studies are; Preliminary insights into m-commerce adoption in Ghana (Boadi et al., 2007); Determinants of mobile banking adoption in the Ghanaian banking industry: a case of access bank Ghana limited (Cudjoe et al., 2015); Adoption of mobile money transfer technology using the structural equation modelling approach (Tobbin & Kuwornu, 2011). It is abundantly evident from the review that there is not much work done on merchant adoption of mobile payment in the Ghanaian context. It is not surprising because the nonexistence of research from, the merchant perspective seems to be a universal phenomenon (de Albuquerque et al., 2016).

Nonetheless, a limited number of studies have investigated adoption from, the merchant's perspective. For instance, Teo, Fraunholz, and Unnithan (2005) investigated inhibitors and facilitators of mobile payment adoption by businesses in Australia. Their finding was that some firms were not willing to trial with mobile payment before mass adoption. Again, the businesses were not comfortable with restricted participation of users based on monopoly from solution-providers. Furthermore, Mallat and Tuunainen (2008) explored qualitatively in Finland the determinants of merchant adoption intention. The findings established that a lack of standardisation and critical mass, as well as the complexity of mobile payment systems, were the main barriers to merchant adoption. Additionally, Lai and Chuah (2010) interviewed industry experts in an attempt to explore the merchant adoption of mobile payment. Inadvertently, finding from consumer adoption research on mobile payment has espoused factors like compatibility (e.g., Lu et al., 2011; Mallat et al., 2009) and trust (e.g., Chandra et al., 2010; Zhou, 2013) as positive drivers of mobile payment adoption. Also, Iacovou, Benbasat and Dexter (1995) identified organisational readiness, external pressure toward adoption and perceived benefits, as the first features that could impact firms to adopt innovation. Existing studies on electronic payments are of the view that the comparative advantages of electronic payment systems include convenience, costs savings, enhanced inventory management, speed and efficiency at checkout counters, more accessible and faster collection of funds, and reduction in the processes of paper-based payments, such as cash and cheques.

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Despite the advantages of mobile payments, merchant adoption research indicates that significant resistance to adoption can be attributed to the fact that merchants do not think it is safe to use mobile payments due to the security vulnerabilities. More so, Kazan and Damsgaard (2016) argue that the non-adoption of mobile payment by merchants can be attributed to a lack of highly compatible and accessible infrastructure that is compatible with their existing payment infrastructure. Additionally, more inherent challenges to the adoption of electronic payments comprise the need for substantial investment in financial operation, the immaturity of mobile technology and possible non-usage by customers as an alternative for payment (Liébana-Cabanillas et al., 2014). Wang and Cheung (2004) explored twelve travel agency CEOs understanding and acceptance of mobile business in Taiwan. The findings reveal that even though all the CEOs anticipated a long-term diffusion of mobile commerce, they revealed that the applicability and usage of mobile commerce are low. This is because, there is fewer competitive pressure, lack of customer need for the service, limited performance and possible incompatibility of current mobile technologies in the purchase process of complex travel services. Again, factors like perceived financial cost and perceived risk have been identified as barriers to adoption in most consumer-centric research on mobile payment (Liébana-Cabanillas et al., 2014; Lu et al., 2011; Slade et al., 2015). The above-stated factors may likely influence merchant adoption of mobile payment.

THEORETICAL BACKGROUND

Diffusion of Innovation (DOI)

As confirmed by Grewal et al. (2017), the extent of merchant adoption and acceptance of mobile payment is slow and has not increased as expected. Various instances of merchants not using the mobile payment system installed in their businesses have also been reported by previous studies (Mallat, 2007). This brings to light the gap in identifying merchants' expectation from technology and factors contributing to enabling technology acceptance and usage (Duarte et al., 2018). Issues of intention and acceptance of mobile payment technology have been researched over the year by several authors (Liébana-Cabanillas et al., 2018; Li, 2018; Liébana Cabanillas et al., 2016; Mallat & Tuunainen, 2008). Different models and conceptual framework which includes The Technology Acceptance Model (TAM), Innovation Diffusion Theory (DOI), Theory of Planned Behavior, Unified Theory of Acceptance and Use of Technology (UTAUT2) and social cognitive theory have been adopted to study the factors they may influence technology adoption (Dahlberg et al., 2008; Ondrus et al., 2009; Venkatesh et al., 2012). Because In the field of Information technology, research in IS innovation adoption has mainly focused on establishing the factors that affect the adoption of different technologies. (Hayashi, 2012; Singh, 2016; Abhishek & Hemch, 2016; Singh & Srivastava, 2018).

More importantly, IT innovation adoption is extensive and has been studied from a different perspective; among them are technology features individual adopters, organization and environment (Rogers 1995; Premkumar, 2003; Goodhue & Thompson, 1995). According to Cooper and Zmud (1990), it is appropriate for stages of IT innovation to be examined when analyzing the diffusion of IT innovation in an organization. The DOI framework is a process-based model that can explain how technology adoption diffuses in an organisation. The theory determines the extent to which innovation will be successful and the factors that enhance the adoption of technology and the extent of diffusion in an organisation. The theory espoused five attributes of innovation that influence the adoption of innovation. (1) relative

advantage, the extent to which innovation can bring returns to an organization; (2) compatibility, the extent to which innovation is compatible with existing business processes, practices and value systems; (3) complexity, relates to how difficult it is to use an innovation ; (4) observability, refers to the extent to which the outcomes of innovation are evident to others; and (5) trialability, the degree to which innovation may be experimented with. Tornatzky and Klein (1982) in meta-analysis established that relative advantage, compatibility, and costs were found to be the most frequently identified factors for innovation diffusion among organizations. The literature shows that the DOI theory has a solid theoretical foundation and consistent empirical support (e.g. Premkumar et al., 1994; Beatty et al., 2001; Zhu et al., 2006). It is an essential theory for studying a diversity of information systems (IS) innovations (Moore & Benbasat, 1991; Lai & Chuah, 2010). With its comprehensive framework, DOI is one of the most robust innovation adoption theory to understand the technology adoption process in an organisation. Besides, the theory's fundamental constructs are suitable for the investigation of individual and organisational level adoption. As a result the DOI is often used as the theoretical foundation for varying studies in identifying the factors for the adoption of technology.

Relative Advantage

The relative, advantage in the organizational context and from an information system point of view relates to performance attributes such as an increase in performance, efficiency and convenience (Davis, 1989; Moore & Benbasat, 1991). Existing studies from mobile payment and mobile commerce context argue that the attributes of ubiquity and independence of time and location has a significant impact on relative advantage and merchant ability to provide service irrespective of location and time (Carlsson et al., 2006; Constantiou et al., 2006; Jarvenpaa & Lang, 2005). Mobile payment technologies deliver ubiquitous payment possibilities, timely access to financial assets and cash payments alternative to merchants. Thus, merchants can perform their transactions remotely without the need to move from one location to the other (Mallat et al., 2009). Therefore, in comparing traditional payment with mobile payment relative advantage include the possibility of time location independent payment.

Compatibility

Deals with the extent to which an innovation meets the expectations, the experiences and needs values of the adopter of the technology (Rogers, 1995). Technology compatibility is usually evaluated in IS adoption research from the individual task and work (Moore & Benbasat, 1991; Taylor & Todd, 1995). In the task of payment, the ability of a merchant to integrate them into their routine is an essential feature of compatibility. Several studies have found compatibility as a critical predictor of mobile payment adoption (Teo & Pok, 2003; Wu & Wang, 2005). Merchant transactions and mobile payments compatibility are likely to impact the adoption.

Complexity

In the diffusion of innovations theory, complexity is determined as the “degree to which an innovation is perceived as challenging to understand and use” (Rogers, 1995, p. 16). Challenges regarding usability and complexity are contributory factors to the minimal adoption of several technologically related payment systems, among them are smart cards and mobile banking (Laukkanen & Lauronen,

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2005). On the other hand, studies have shown that ease of use and convenience positively influence a merchant's willingness to adopt mobile technologies and services (Jarvenpaa et al., 2005; Teo & Pok, 2003). Mobile payments are commonly expected to increase merchant's convenience by reducing the need for coins and cash in small transactions and increasing the availability of payment possibilities (Mallat et al., 2009). Limitations in mobile device features, however, diminish the usability of mobile technologies (Siau et al., 2004).

Trialability

Trialability denotes the ability to test new technology before adoption. When Potential adopters are given an opportunity to try and experiment with innovation, they become more comfortable with it and can influence the potential adopter to adopt the innovation (Agarwal & Prasad, 1998; Rogers, 1995). Also, a researcher like Tan & Teo (2000) argue that if a potential adopter is allowed the opportunity to try the innovation it will reduce the uncertainties surrounding the innovation, and can influence the individual to adoption.

Observability

Observability aspect talks about the visibility of innovation to members in the social system and the advantages that can be visibly observed and be communicated Observability of an innovation describes the extent to which innovation is visible to the members of a social system, and the benefits can be easily observed and communicated Rogers (1995). Moore and Benbasat (1991) simplified the original construct by redefining observability into two constructs: visibility and result demonstrability. In the context of mobile payment, observability is defined as the ability to make payment at any time and from any location without any delay or queue, and seeing the effect of mobile payment transactions immediately, and conveying the accessibility benefits to others. Through such exposure, merchant gains knowledge about mobile payment and its benefits, thereby facilitating adoption.

Perceived Technology Security

Perceived technology security takes into consideration the feelings of uncertainties inherent in technology usage (Cheng et al., 2006). These Information security concerns are measured by the perception of the buyer, on how sellers unwilling and unable to secure information on individuals' transactions. This makes the buyer uncertain and is seen as a barrier to e-commerce adoption and a significant barrier to broad adoption and use of mobile payment (Chang et al., 2014). Previous studies have pointed out that apprehensions about security, where financial information is managed constitute a barrier to the intention of adopting the technologies (Cheng et al., 2006; Pavlou, Liang & Xue, 2007; Salisbury et al., 2001).

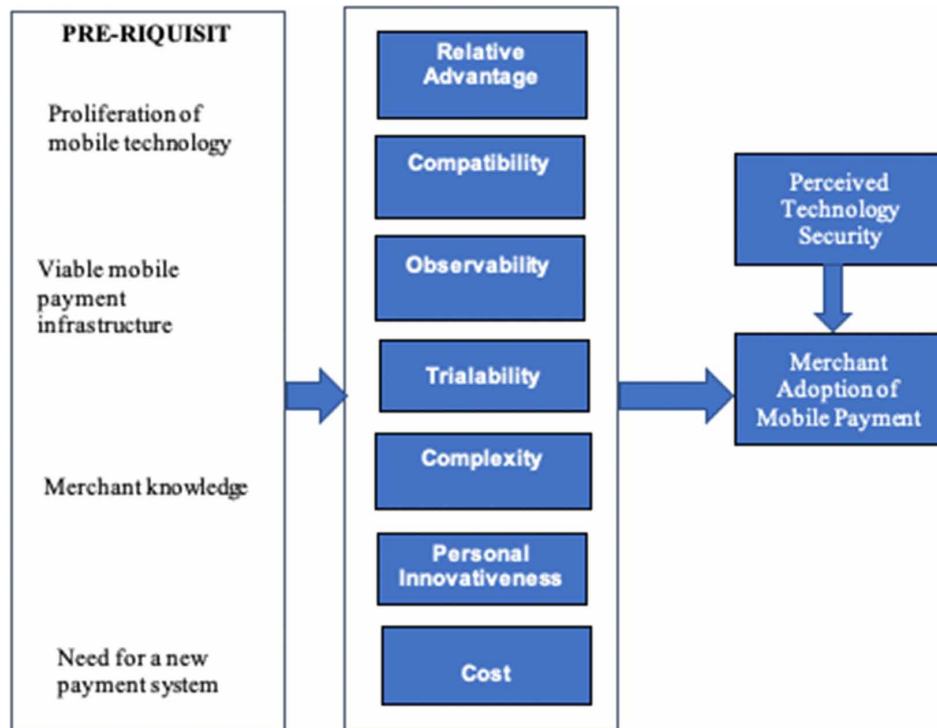
Conceptual Model

The conceptual model guiding the study is adopted from the diffusion innovation theory by Rogers (1995) and literature from perceived technology security. The combination of DOI theory and the perceived technology security will enable a comprehensive appreciation of mobile payment phenomenon and merchant intention to adopt. Acceptance of new technology by users can be quite complicated and

requires more than a single model hence, the two theories (Shen, Huang, Chu, & Hsu, 2010). Also, a more integrative approach will provide complete evidence of the issues underpinning the relationship as well as a unique insight that cannot be obtained with a single theory (Jackson, Yi, & Park, 2013). DOI constructs were included in the research model to determine their influence on the adoption of mobile payment by merchants. More so, innovation factors are essential factors to consider in mobile payment adoption because mobile payment is a disruptive technology. As such, innovation factors play a significant role in the behavioural intention leading to its adoption. Earlier studies on information technology innovation have confirmed the suitability of diffusion innovation theory in predicting the adoption of different technologies (Zhu, Dong, Xu & Kraemer, 2006).

Arguably, mobile payment involves financial information that is personal and sensitive; security concerns can become a barrier to technology adoption (Duane, O'Reilly, & Andreev, 2014). The minimisation of the security concerns of the use of technology is an essential element to enable the merchant to feel secure in conducting financial transactions with mobile payments (Oliveira, Thomas, Baptista, & Campos, 2016). There is likely to be a positive influence in the behaviour of the merchant to adopt the mobile payment technology when the merchant perceives security around technology use. This informed the inclusion of Perceived Technology Security in the research model. However, extent review of IS innovation research indicates specifically that relative advantage, ease of use and compatibility are the three most consistent innovation characteristics that determine adoption. More so, studies on innovation diffusion demonstrate that innovation is a critical element, but individual innovativeness is also a vital variable in predicting the outcomes of technology adoption.

Figure 1. Conceptual framework for merchant adoption of mobile payment



RESEARCH METHODOLOGY

The qualitative research aimed to acquire detailed information about merchant perceptions on enablers and inhibitors of mobile payment adoption. The study is an exploratory study to help bring a deeper understanding of the issues under study (Saunders et al., 2012; Denzin & Lincoln, 2005; Myers, 1999). As such, the study utilizes; a case study approach to investigate the determinant of the merchant intention to adopt mobile payment, a case study was considered appropriate for this research based on Yin's (2009) assertion of a case study where the "why and the how" questions are asked. Also, case studies are helpful in situations where there is not much theory to explain issues adequately, and the researcher does not have much control over the issues under investigation. Also, the case study allows an in-depth contextual understanding of the phenomenon under investigation. (Cavaye, 1996; Yin, 1994; Eisenhardt, 1989). Merchant adoption of mobile payments is a new phenomenon that needs an in-depth understanding from the perspective of the merchants in a resource-constrained environment to better appreciate merchant perceptions on enablers and inhibitors of mobile payment adoption in Ghana. The study will follow a descriptive case study approach to enables theory to guide the data collection process (Yin, 2009). Given this, The Diffusion Innovation Theory and Perceived Technology Security are reviewed as the theory underpinning the case study design. This approach was used due to its flexibility in allowing for multiple sources of data gathering. In this study, the author used face to face interviews as a data collection method. The interview guide consisted of both open and close-ended. The questions were such that it satisfies the objectives of the study. The interview guide was reviewed to conform to the objectives of the research went through a process of review to ensure that the questions were adequate and conform to the objective of the study.

The study interviewed a small-scale cottage industry that is into the production of fruit juices for local restaurants and eateries and a small clothing retail company that is benefiting from mobile payments. These companies were strategically selected because they have adopted mobile payments innovation and thus have firsthand experience and an in-depth view on the topic, and therefore can provide insightful comments about the enablers and inhibitors of mobile payments adoption. Data was collected for this research work from April 28th, 2019 to June 17th, 2019, the field data collected were appropriately organised to ensure no data is lost and also to make sense of the data. Afterwards, the author listened to the recorded interviews to be familiar with the data and also to engage the data. Further, each interview was transcribed and typed in Microsoft word. Also, notes taken on the field were arranged correctly to make logical sense and meaning. As emphasised by Boateng (2016) a researcher is advised to take notes and read through the notes, this will help in categorising each respondent's response according to how relevant each response is to the research questions. Based on this understanding, the scripts were read many times for a general understanding of the responses and to understand its contributions to the research and the research objectives. Thematic approach, as illustrated by Braun and Clarke (2006), was used as a guide for the data analysis. The data was initially summarised, edited for accuracy and segmented; this was to help the author to present issues and conversation rather than actual words used in the conversation. The second stage in the analysis grouped the summaries into a smaller number of categories, themes and constructs to help create a more meaningful construct. The case study was analysed using a pattern- matching as described by Yin (1994) to help establish the findings that support the research questions. As a result, the key constructs in the data were extracted based on the research framework.

DATA ANALYSIS

Case A

The interview was conducted with the manager of a fashion retail shop who is also the owner of the business. The manager has tertiary education and has been working as the manager of the shop since 2010. The shop turnover is estimated between GHS30,000 to 50,000 (Thirty thousand cedi and Fifty thousand) annually in a suburb of the capital city Accra Ghana. She has two shop attendants with secondary school education who act like the customer contact point in the shop and also responsible for the day to day sales at the shop at the same time the manager is responsible for the more strategic issue of the business. The respondent mentioned that (the company) is officially registered as a business with a particular SIM and code on the MTN mobile payment platform. The manager attributed this choice to the service provider's critical mass, and full reachability as well as the service providers ability to transfer money across borders.

Further, she intimated that her motivation for adopting mobile payment is also based on the fact that, the particular merchant SIM is registered to the business, so all payments are made in the name of the business which according to her reduces pilfering in the shops and helps with tracking of income no matter the location. Before registering the company and adopting mobile payments, she was using her mobile account as compliments for customers who wanted to pay via mobile. However, she discovered that a lot more customers were requesting for mobile payments. That was when the business realised that mobile payments could be the game-changer for the business and benefit their customers through faster service. Also, her wholesale partner encouraged her to register the company for an official company mobile payment account. She registered with MTN the most prominent mobile network operator in Ghana as her service provider, and she was set up officially with a code, a display sign to reinforce to customers that the shop accepts mobile payment.

Mobile payments give the merchant the opportunity and affordances to facilitate efficient business transactions and an innovative business solution, which serves as a vehicle to uniquely position the merchant to provide value-added services for their customers (Yu & Ibtasam, 2018). The fashion shop manager mentioned that the fashion business is very dynamic and to remain profitable and competitive, there is a need for an innovative business model. According to her; The affordance of mobile payment enables the company to buy clothes online and pays online via a mobile payment through MTN. Even though the company has two brick and mortar shop, the strategy is not to stock most of the items physically in the shop but download the clothes online and display the various items in the client WhatsApp page on the company mobile phone status for her customers to make a choice. She orders the clothes online, and pay through mobile payment. The items are delivered to her within two weeks of ordering then she distributes to the clients via delivery according to the client's order, and they also pay her via mobile money.

I do not have to go to China or go to Accra Central, the capital city of Ghana to sort among large bails of clothes. I use, the KIKU app to shop online, and order the items my clients have selected from the list posted on their various WhatsApp pages and pay with MTN Momo. In two weeks, I have my orders delivered to me, and I also deliver to my customers who have the option of paying by cash on delivery or mobile money directly into my company mobile payment account.

Enablers and Inhibitors of Merchant Adoption of Mobile Payments

Merchant use of mobile payments provides leverage for convenient business transactions with value-added services for competitive advantage in their business environment. The improvement in mobile payment solutions, which includes a multicurrency wallet is facilitating payment worldwide. It is a significant potential that companies can leverage to serve their customers in developing countries. The adoption of mobile payment with its multicurrency features is helping the small retail business to make payments to their business partners payments to suppliers, receiving payments from the customers, paying utility bills, and paying salaries of employees, simply and cheaply across borders without incurring exorbitant currency exchange fees. It also provides small businesses with faster and less expensive transactions than those completed in traditional settings, which reduce the transaction cost and time for the respective parties.

As intimated by the shop manager: "My official registration with the service provider enables me to use my mobile money account to buy clothes online without hassle which was not possible before I adopted mobile payment" as soon as I, place the order, I can pay via the mobile payment without changing my cedis into dollars. The beauty is that with the app, the prices are quoted in cedis, and I pay without foreign exchange issues".

The respondent also emphasised that the use of mobile payment has simplified international trade and has reduced intermediaries in trade and have reduced the cost of doing business.

As stated by the shop owner: Mobile payment and the internet with the App, I can buy online and pay. Before, I was buying in bulk from an importer locally, but now I buy myself online no matter the quantity they are willing to deliver. Which has simplified doing business and I make a profit than before because the prices online are competitive for example a nightdress delivered to me at the shop cost 18ghc at the same time, my distributor was selling to me at 25gh with such a price I can sell more at lower prices to my customers.

Nevertheless, the retail manager at the shop hinted that she believes many merchants have not yet adopted mobile payment simply because they do not know the benefit it provides. The merchants do not have enough information about the service.

I am not sure most of the small-scale businesses understand the benefit of using mobile payment.

Also, there was the issue of transaction fees charged and the cap on the daily amount that individuals or businesses can transfer in one go. They also assume that the service is not easy to use and the issue of education and confidence to use the technology also came up as one of the factors that inhibit merchant adoption of mobile payment.

Case B

The company is a cottage fruit processing business, a startup that was established in 2016. The factory employs ten factory operatives and a general manager, who is also the owner. The business, according to the owner-manager uses the personal customer SIM of the manager to do transactions on behalf of the company but not an official unique SIM design for merchants from the service provider the individual

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consumer SIM is hooked onto the MTN payment platform. According to the general manager, the company adopted mobile payments because the business is virtually run by one person hence, for the sake of convenience and efficiency mobile payment was going to play a vital role in payment transactions. Besides a lot of consumers and smaller businesses like theirs were using mobile payment, especially MTN mobile money; hence, it was not out of place for my business to adopt mobile payment. As stated by the manager

Using mobile payments makes business sense because a lot of small businesses are also using it and is also convenient.

According to the general manager of the fruit juice processing company, the orders are sold on 14 days credit to restaurants, eateries and retail shops. The sourcing of raw materials for processing are from out-growers in the sounding villages directly by the company. Sometimes, raw materials are sourced from micro traders who retail the raw materials in the local market. However, the packaging materials are supplied by small scale labelling manufacturing companies who deliver directly to the company. Before, adopting mobile payment for the business, most of the transactions were done in cash and were mostly face to face, which was very stressful and time-wasting. For example, I was personally going around manually to collect credit sales. The manager believes that the adoption of mobile payment in their business is instrumental, because it enables the company to initiate a payment from the system and able to receive it. It helps to accomplish a lot, sending money from one point to the other we no longer travel to suppliers to pay, I can initiate payments at every location.

This is helping the business focus on activities that add more value and generate more significant revenues while saving time and money in the collection of payment; customers do not reschedule payment once there is electronic money, they can pay instantly.

According to the general manager, as a startup business, they have limited resources; the use of mobile payment has helped simplify the payment process and make transactions efficient. This is because the business can receive payments, move money cheaply to pay for transactions in their value chain without going to the bank or moving from one client to the order.

I do not go to villages as often as I use to do, I have built relationships and trust with my supplier over the years, and they supply me with raw materials, and I pay with mobile payment.

From the assertion, mobile payment as an innovative payment solution has led to the reduction of cost for the company, which has the potential of increasing the profit of the organisations. The manager interviewed was of the view the service providers in the country, are reputable; however, they believe that customers, especially businesses, could be at risk with their information that is with the service provider; thinking that they can release the customer information to a third party.

Because most of the time, an individual can receive information from third parties, you have not subscribed to their services, and you wonder if your personal information is in wrong hands. This makes merchants unsure of the security of their information with the service provider, which she thinks could be detrimental to the business when given to a competitor.

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According to the respondent, using mobile payment as a business comes with a considerable risk because mobile payment operates in a wireless environment, people can steal information from the provider. Also, there are criminal activities in the cyberspace. Criminals can access customers' mobile accounts fraudulently and to defraud an unsuspecting business individual. They can hack into individual accounts and wipe the accounts of unsuspecting customers. Most of the time merchants, are unable to retrieve their money back. Further, the respondent intimated that the telecom companies lack experience in financial regulations and do not have expertise and experience in financial service delivery. Hence, their expansion into financial services can poses business risk to businesses who adopt mobile payment. As responded by the manager;

With mobile payment, you are not sure where to seek reimbursement when your money 'gets lost' in the virtual payment network between agent and service provider. However, with the banks, you can always go to the bank to address theft issues, so I think banks must take the lead in developing mobile payment while telecom operators provide technological support.

The manager also stated that one of the challenges with mobile payment adoption for businesses is the inability of mobile payment to deal with large sums of money. There is a daily quota a business can transact depending on the business documentation and the regulatory guidelines. This, according to the respondent, can inhibit large organisations, from adopting mobile payment.

One other challenge that came up with mobile payment adoption is the lack of technical skills and English language skills. For example, most of the local farmers and the market traders are not literate .They cannot read and write, as such are not confident to appreciate the transactions, so they do not adopt mobile payment for lack of confidence and literacy to carry the payment instruction through, which serves as an inhibitor for the adoption of mobile payments, especially for rural small scale merchant.

Sometimes the farmers I deal with are not willing to accept mobile payment because they do not trust the system.

According to the respondent: Notwithstanding these concerns, mobile payment is very efficient and does not require much to understand and operate as a merchant. It is vital that the nation develops regulations for it and increases the security measures around mobile payment and guard against the charging of double fees.

It is a very excellent system that needs to be developed to make our country cash "lite".

FINDINGS

Enablers

Business managers are adopting mobile payment for businesses to facilitate new business models within an organisation, by offering different possibilities for the growth of businesses. It is evident from the case that the adoption of mobile payment is helping small businesses to creatively develop an innovative business model which ultimately enhances profitability and substantial operational efficiency (see

Boateng,2011). Further, the use of mobile payment can create access to a different segment of the market, which was not reachable before which help create different customer segments for business to create value. Instead of moving physical objects or tokens, such as paper money, checks, or notes, mobile payment has transformed the nature of payment among businesses by allowing the value to be transfer electronically through a mobile phone across borders. The finding is similar to the finding of Liébana-Cabanillas et al. (2018) who established that Payments made through mobile phones are one aspect leading to essential changes in international trading due to the accessibility that the technology provides. Innovatively, from the analysis, it is evident that businesses adopt mobile payment to enhances key partnerships by firming buyer-supplier relationships, which ensure reliable supplies. The adoption of mobile payment by merchants can increase market efficiency by improving access to supply, and to help reduce search costs, which can improve the management of supplies and increase the productive efficiency of firms. Arguably, this peer-to-peer partnerships between businesses, are strengthening and extending supply chains (see Mothobi & Grzybowski, 2017).

More importantly, from the analysis, the adoption of mobile payment by businesses is altering the “status quo” by reducing transaction costs and promoting the disintermediation of traditional intermediaries (e.g., banks, currency exchanges). It is also reducing processing costs through instant authentication and confirmation of the payments. This affords businesses a secure, faster and less expensive payment transactions without merchants experiencing delays sending money abroad without exorbitant exchange fees. The authentication and authorisation, making a payment, initiating accounting and confirming the completed transaction, are done in real-time through the mobile phone. This has potentially reduced the time and cost associated with physical transmission, especially across distance. This finding is in line with previous research; Boateng (2011) identified the impact of mobile payment as a reduction in operational costs, it also enhances shorter settlement time, reduction of risk, new revenue opportunities, and a reduction in the costs of capital (Kabanda & Brown, 2017). More importantly, the use of mobile payment has enabled partnership and startups, such as delivery companies and technology startups that develop application programming interfaces (APIs) and software development kits (SDKs) which maintain the transactional algorithms to enable retailers to quickly and easily accept mobile payment at point of sale without requiring the installation of additional terminal hardware. The MTN mobile payment platform does not require an additional point of sales device for the businesses that adopt mobile payment (see De Kerviler, Demoulin & Zidda, 2016).

Inhibitors

From the findings, one of the limiting factors that affect a manager’s considerations for mobile payment adoption includes data breaches and data security as well as privacy concerns. This is seen as significant issues that could affect merchant adoption of mobile payment. Merchants believe that although mobile payments improve operations, there are instances of fraud, particularly in the peer to peer transfer sector. Fraudsters can assess merchant account to defraud them and abscond with tens of millions of cedi. This is the respondent said it is a significant hindrance to merchant adoption. The merchant believes that mobile transaction is almost like a web-based transaction, so it needs to be secured to protect sensitive information. This finding is similar to the finding by other researchers like Musa et al. (2015) and De Kerviler et al. (2016) argued that security and privacy are significant factors influencing mobile technology-related financial transactions. Privacy is critical in adopting location-based services for m-commerce. (Wang et

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al., 2016; Jin et al., 2017), also argue that one of the vital inhibitors that can influence merchant decision to adopt mobile payment technologies for financial transactions is security issues.

Furthermore, the findings demonstrate that lack of technology skills and English language skills demotivate small scale merchants who are not educated to adopt mobile payment. This is because they perceive the use of technology as severe, and usually, develop a negative impression of mobile payment. The finding established that the merchants expressed interest in the technology but the lack of knowledge and the perception that the technology is sophisticated makes them uncomfortable to use the mobile payment for their transactions. This plays a significant role in inhibiting merchants from using mobile technology for financial transactions, especially among the less educated merchants (see Dauda & Lee, 2015; Musa et al., 2015). This finding also agrees with existing research (Liebana-Cabanillas et al., 2015; Yoon & Kim, 2013; Slade et al., 2013; Liu et al., 2015) who stated that limited knowledge of mobile and Internet usage might prevent users from using mobile payment transactions.

The challenge of gaining the trust of merchants is one of the significant challenges confronting mobile payment adoption by merchants in small scale businesses in Ghana. There are linkages among technological skills, the complexity of the technology, which also leads to privacy concerns, and security, concerns for the merchant. In Ghana, for example, the regulatory framework on mobile payments is not very well developed and firmed up most merchants do not understand where to address an issue regarding fraud and security related issues. This confirms the suggestion by Mallat (2007) that users' perception of 'lack of security' and 'trust in payment systems' are among the vital problematic issues to e-commerce/m-commerce transactions. Finally, from the analysis, the merchants complained about the cost, especially about the charges involved in using mobile payment, especially when it has to do with bulk payment, which does not encourage merchants to transfer large sums of money using mobile payment. Hence mobile payment is unable to replace traditional payment but as a complement to traditional payment (see Van der Boor et al., 2014).

Other Findings

From the analysis, it is clear that the benefit of mobile payment adoption by merchant depends on the target market, because most educated people have adopted mobile payment and are using in paying for goods and services directly from their wallet making all kinds of transactions using their mobile payment. In contrast, in the village, most farmers who are paid via mobile payment do not spend from their wallet but rather cash the money and transact in cash, which may be attributed to education and technology savviness. There is evidence in the analysis that managers are adopting mobile payment because of the growth of technology and especially the advancement of mobile technologies and the reduction of the barriers (see de Luna et al., 2019). Managers believe that mobile payment is likely to become the means of payment in the future and businesses do not want to be left out. This finding is confirmed by a study conducted by Accenture Consulting (2015), where consumers anticipate a reduction in traditional payment to the advantage of digital payments. Business managers are anticipating future critical mass where mobile payment is regarded as the next big thing in payments. Especially in developing countries where there is lack of quality infrastructure for payments (see Bourreau & Verdier, 2010).

CONCLUSION

From the studies, it is imperative for service providers of mobile payments to enhance technological issues, especially with regards to privacy protection which, in turn, could enhance users' experience and trust towards mobile payment adoption. This is because of the lack of trust and risk issues are regarded as critical limiting factors to the adoption of mobile payments by both merchants interviewed (see Ramadan & Aita, 2018). Despite the challenges expressed by managers in adopting mobile payment. It is reassuring to see a growing interest by companies to explore opportunities with mobile payment technology. Managers are well advised to continuously monitor mobile payment technologies to assess their impact and consider the strategic importance of mobile payment for their business. If they do not do so, they will lose their competitive edge to those managers of firms, whether new or old, who understand the mobile payment and who are ready to innovate their business models. This is because the merchant adoption of mobile payment is advancing rapidly toward greater acceptance. Smart executives and managers should understand how the technology fits in their business and how it can help improve operations to capture its advantages ahead of its competitors. One significant contribution of this study lies in the development of a conceptual framework for merchant adoption of mobile payment with, a particular focus on small and medium size merchants in developing countries. A relatively unexplored area of study after a decade of mobile payment research.

The study does not only contribute to mobile payment adoption analysis from the supply side of the market, but also, incorporate additional merchant adoption enablers and inhibitors that merit attention in mobile payment application. Additionally, the study offers various practical insight from developing country perspective, which will serve as a guide for future studies in merchant adoption. The study of merchant perceptions of mobile payments adoption will enable practitioners, especially mobile service providers, to understand merchants' perspective on mobile payment, which will be a foundation for the delivery of appropriate service to their clients. Despite these contributions, the study has a limitation in that it considers a limited number of cases. However, the purpose of selecting the cases was to enhance the external validity of the case strategically and not to address statistical considerations. As an initial step in understanding merchant adoption issues from a developing country perspective, this finding has thrown light on how future studies could be conducted.

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Chapter 30

A Comparative Study of Mobile Banking Adoption: An Analysis of Banking Customers in U.S. and Thailand

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ABSTRACT

Recently, mobile banking has gained significant importance, and the growth of the field is accelerating. Due to a rapid increase in smart phone users, banks have shifted the competitive landscape from physical banking branches to internet banking and mobile banking services. However, many customers remain reluctant to use this banking channel. It is crucial for banks to meet customers' need and understand which factors play an important role in encouraging or discouraging them from using mobile banking. Culture can also play an important role on these factors. This study compares the mobile banking perceptions between the consumers in the U.S. and in Thailand and reveal various factors that influence mobile banking adoption for these two nationalities. The findings suggest factors that banks should consider when implementing mobile banking services, thus allowing them to design the services that meet the needs of their customers.

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INTRODUCTION

Emerging technologies often result in new opportunities, choices, and possibilities, which allow businesses to open new channels for offering products or rendering services to meet their customers' need (Bhattacharjee et al. 2006, Changchit et al., 2017). The increasing popularity of the Internet has created great challenges for companies to offer products or services via this new distribution channel (Chau & Lai, 2003). As with other types of online businesses, Internet and mobile banking has gained significant importance, and the growth of the field is accelerating (Afshan & Sharif, 2016; Kim et al, 2013). The Internet-based technologies enable banks to provide customized content that can educate and cross-sell while strengthening the long-term relationship between banks and customers (Chau & Lai, 2003). Banks around the world have invested about \$115 billion for the purpose of increasing mobile banking adoption (Baadullah et al., 2019).

With a growing number of households turning towards the world of e-commerce, it is crucial for online businesses to realize the need to run their business to suit the convenience of their customers. Recently, the number of consumers owning sophisticated mobile handheld devices, i.e., smart phones, has rapidly increased (Gerpott et al., 2013; Kim et al., 2013). The functionalities of this communication device not only enable consumers to make voice calls but also allow them to perform several transactions via mobile applications (West & Mace, 2010). The mobile devices can be used not only for personal activities, but also for business-related activities, particularly in mobile environments (Zhang & Jasimuddin, 2015). Rapid advances in mobile technologies and devices have made mobile banking increasingly important in mobile commerce and financial services (Lin, 2011). This service provides a more convenient means for customers to meet their banking needs with more complete and timely information (Baptista & Oliveira, 2015; Gerrard & Cunningham, 2003). However, many customers remain reluctant to use the mobile banking due to its security (Muñoz-Leiva, Climent-Climent, & Liébana-Cabanillas, 2017). These situations increase the number of mobile banking users and it is interesting issue of finding which factors the users use in adopting the mobile banking services.

Research in this area have expanded to investigate the reason of using mobile banking outside U.S. Cross cultural effect has been found to be important in many studies (Al-Refaie, 2014; Ao & Liu, 2014; Bin et al., 2003; Greenberg et al., 2008; Yan et al., 2014; Lippert & Volkmar, 2007; Chang et al., 2015). For instance, Chang et al. (2015) gathered survey data from university students in Cambodia, Iran, and South Korea producing results showing that country development index has a significant effect on the levels of the digital divide. A study conducted by Hung et al. (2012) revealed that respondents from different cultures prefer different communication methods. Shin and Choo (2012) use the sample from U.S. and Korea to study the cross-cultural effect on smart phone users and find that different value preferences, intention, and adoption patterns were observed for the two countries.

Even though the literature on the adoption of mobile banking is quite extensive (Afshan & Sharif, 2016; Lee et al., 2013; Lin, 2011; Nel & Boshoff, 2014; Staff, 2013), few studies have explored the motivations for mobile banking adoption in a cross-cultural manner (Baptista & Oliveira, 2015; Yu & Chantatub, 2015). In particular, there is no prior study comparing consumers' attitude toward the usage of mobile banking between the U.S. and Thailand. The comparison between the U.S. and Thailand was chosen because both countries show a high percentage of mobile banking usage (64% in Thailand and 42% in the U.S.), as reported by Statista (2015). In addition, despite many prior studies in mobile banking, this study provides several contributions to the literature. First, since smart phone technology has dramatically changed since the last five years, many mobile banking features have been either added

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or improved as well. Although some constructs in the proposed model were examined in the past, the findings may not be relevant nowadays. Second, this research extends the study of factors investigated in prior studies to include the factor “Previous Experiences”. It was hypothesized that consumers’ experiences on using mobile banking should influence their attitudes toward mobile banking adoption. Third, unlike prior studies that did not track whether subjects have used mobile banking before or not, subjects in this study contain only those who have experience using mobile banking before. Attracting potential customers and retaining existing customers is crucial to the long-term business success of mobile banking firms (Gu et al., 2009). Therefore, the responses gathered from this target group of subjects should not only help banking services understand the needs of their customers in regard to the adoption of mobile banking but also help them improve the retention rate of their existing customers.

Contributions from this study can be obviously obtained both academically and practically. The findings should provide a better understanding of localized demand for mobile banking. It is apparent that better service quality should be met by the devotion to serving local need (Singh et al., 2003). In other words, suggestions from this study should allow banking institutions to provide a better quality of mobile banking services and expand their target customer base by providing information regarding the specific needs of customers from different cultures. This study aims at comparing the mobile banking perceptions between the consumers in the U.S. and in Thailand. The findings should reveal various factors that influence mobile banking adoption for these two nationalities. These results should help banks gain an understanding of these factors, and thus direct their efforts to develop features that satisfy the needs of their target customers and alter their business model to promote factors that have a positive influence on mobile banking adoption.

This study is structured as follows. First, the rationale of the study is mentioned. The second section discusses the literature review, which will present related empirical studies. The mobile banking situation in Thailand as well as related literature on cross-cultural influences is also discussed in this section. In the third section, a theoretical framework, a research model, and hypotheses are proposed. The fourth section presents the data and analytical model with the results. The fifth section is the conclusion. Practical implication is also discussed in this section.

LITERATURE REVIEW

Internet banking has emerged as one of the most profitable e-commerce applications over the last decade (Intana et al., 2013). The annual survey of 1,000 U.S. adults conducted by the American Bankers Association (ABA) revealed that nearly one-third of respondents (32 percent) indicated Internet banking as the method they used most often to manage their bank accounts (American Bankers Association, 2015). The Internet banking application provides many advantages, such as faster transaction speed and lower handling fees (Lee et al., 2011).

Internet banking brings advantages both to customers and banks. It provides customers with a fast and convenient way to undertake various banking transactions from the comfort of their home, office, or other preferred space, during and after banking hours. Customers can avoid travel time and the need to wait in queues to access banking services. For the banks, Internet banking has improved productivity and efficiency, reduced costs, and enhanced customer service. Furthermore, Internet banking usually requires less staff and fewer physical branches resulting in much lower operating costs (Yaghoubi & Bahmani, 2010).

In parallel with the growth of Internet banking, mobile banking has gained significant importance, and the growth of the field is accelerating (Lin, 2011; Salehi & Alipour, 2010). Mobile banking is a channel whereby the customer interacts with a bank via a mobile device (Singh et al., 2010). Due to a rapid increase in smart phone users, banks have shifted the competitive landscape from physical banking branches to Internet banking and mobile banking services (Nasri & Charfeddine, 2012). In this digital age, financial technology offers a new service platform for banking sector in the world. The number of mobile payment transactions has increased by approximately 58.33 percent from 2014 to 2015 (Dapp, Slomka, & Hoffmann, 2015). According to a recent survey, although Internet banking is still America's most popular banking method, mobile banking continues to grow. Mobile banking is now preferred by 12 percent of consumers—up from 3 percent when it was surveyed five years ago (American Bankers Association, 2015). With the help of mobile banking, bank customers can easily access banking facilities such as information inquiry, account managing, bill payment and money transfers etc. (Luarn & Lin, 2005).

Several studies were conducted to examine the factors influencing the usages of mobile banking. For instance, Alalwan et al. (2017) investigated the extended UTAUT factors and trust in influencing behavioural intention and adoption of mobile banking. The results showed that all extended UTAUT2 factors, except social influence, and trust affect mobile banking adoption through behavioral intention. Afshan and Sharif (2016) analysed the dimensions of mobile banking acceptance and found a significant association of task technology fit, initial trust, and facilitating condition with intention to adopt mobile banking. Lin (2011) developed a research model to examine the effect of proposed factors on attitude and behavioral intention about adopting (or continuing to use) mobile banking across potential and repeat customers. The results indicated that perceived relative advantage, ease of use, compatibility, competence and integrity significantly influence attitude, which in turn lead to behavioral intention to adopt (or continue to use) mobile banking. Trust also plays an important construct in explaining the intention to use mobile banking in the research of Sharma and Sharma (2019) whose finding shows that satisfaction is intermediary factor to the relationship between trust, service quality, information quality and intention to use mobile banking.

Kang et al. (2012) developed a model that explains sustained use of mobile banking services. The study results pointed out that perceived usability, channel preference, and perceived value were three major determinants of sustained mobile banking use. Another study proposed a model to predict users' intention to use mobile banking (Song, 2015). The results found that perceived usefulness, perceived ease of use, social influence, and trust perception significantly effects user adoption. AlSoufi and Ali (2014) studied the mobile banking adoption in Bahrain. The results revealed that the intention to adopt mobile banking is mainly affected by perceived usefulness and perceived ease of use. Using Technology Acceptance Model (TAM) with social image, trust and perceived risk integrated, Muñoz-Leiva et al. (2017) found both direct and indirect effects of these factors on users' attitude and intention to use mobile banking apps.

Gu et al. (2009) examined and validated determinants of users' intention to adopt mobile banking. The study found that self-efficiency was the strongest antecedent of perceived ease-of-use. In addition, Structural assurances were the strongest antecedent of trust. Another study found that performance expectancy, task technology fit, social influence, and facilitating conditions had significant effects on mobile banking adoption (Zhou et al., 2010).

Internet and Mobile Banking in Thailand

Internet in Thailand was dated back to 1987 (Thailand Chapter of Internet Society, 2015). The first Internet email services were operated under an agreement made by the Asian Institute of Technology (AIT) and the Department of Computer Science at the University of Melbourne in Australia (Intana et al., 2013). A major breakthrough occurred in 1991 when Chulalongkorn University became an Internet gateway in Thailand, becoming fully operational in July of 1992 (Thailand Chapter of Internet Society, 2015). Nowadays, over one third of the population in Thailand has regular access to the Internet (National Statistical Office, 2014).

The Bank of Thailand (BOT) regulates and supervises financial institution operated in the country (Suanmali, 2015). Internet banking offers many benefits to banks as well as their customers. One study summarized the advantages of Internet banking services as follows: (1) cost saving, (2) increased customers, (3) enabling of mass customization for e-business services, (4) extended marketing and communication channels, (5) search for new innovation services, and (6) exploration and development of non-core businesses (Ongkasuwan & Tantichattanon, 2002).

The number of mobile subscribers in Thailand had exceeded its population since 2010 (Suanmali, 2015) and this situation leads to an increasing usage of mobile banking services. Although Internet banking in Thailand is increasing, not all customers are ready to adopt this channel of banking services (Intana et al., 2013). It is a challenge for banking businesses to revise their strategies to attract more customers for Internet banking. One study reported that Thai people find security to be insufficient and thus holding them back from adopting Internet banking (Esichaikul & Janecek, 2009). The study also revealed that the lack of customer service was a major reason preventing them from adopting Internet banking as well.

Rotchanalitumnua and Speece (2003) studied barriers to Internet banking adoption. The research findings from interviews with Thai firms suggested that the security of the Internet is a major factor inhibiting a wider adoption of Internet banking in Thailand. Subjects revealed that they did not feel comfortable making financial transactions via Internet channels. The management also has negative attitudes toward Internet banking adoption and usually cites the reason as lacking resources. Jaruwachirathanakul and Fink (2005) applied the decomposed planned behavior to identify the factors that encourage customers to adopt Internet banking services in Thailand. The research findings revealed that “Features of the Web Site” and “Perceived Usefulness” are the two factors that encourage the adoption of Internet banking in Thailand. They also reported that the factor that inhibits the adoption is “Perceived Behavioral Control.” Another study conducted by Namahoot and Laohavichien (2015) reported that information quality (i.e. the accuracy of the online transaction record) of online banks in Thailand was negatively correlated with trust to use Internet banking. Trust was also found to be the critical factor leading to the adoption of using Internet banking in Thailand

With more advanced computing ability and connectivity, smart phone applications become more popular in this era. Based on Payment Systems Report 2017 by Bank of Thailand, mobile banking customers have been dramatically increasing since 2015 as shown in Figure 1. Since then, customers prefer mobile banking to Internet banking. The number of mobile banking users at the end of 2017 grew by 51% from 2016. These increasing numbers were driven by banking applications, which are easy to use and offer a variety of services. Moreover, banks use aggressive marketing campaigns to attract more customers. Another important factor that drove the use of mobile banking is a PromptPay operation since the beginning 2017. The number of registered PromptPay users in 2017 were 40.4 million and the PromptPay transactions via mobile and internet banking grew approximately 26.3% per month (Bank of Thailand, 2017).

Figure 1. Number of internet banking and mobile banking accounts (Bank of Thailand, 2017)

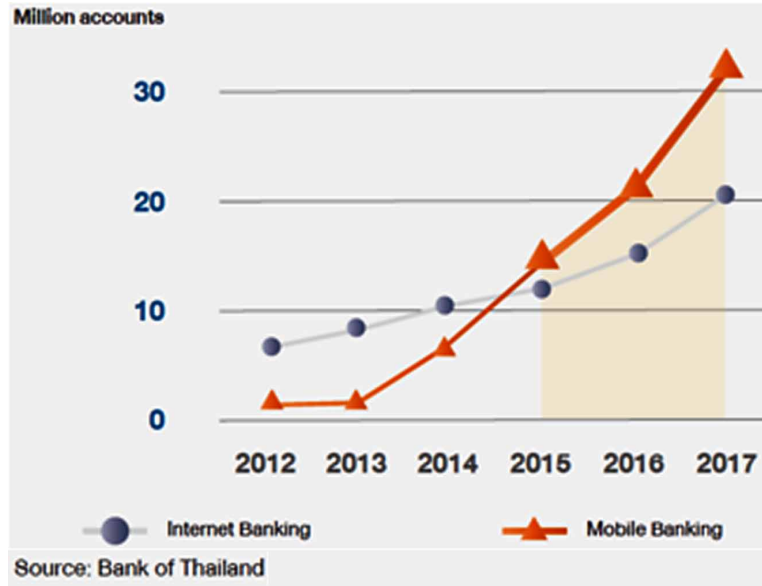


Figure 2 shows that the volume of mobile banking transactions in 2017 increased from 2016 by 110%. This trend is consistent with an increasing number of mobile banking users. At the same time, Figure 2 shows that internet banking transactions is lower in terms of both volume and growth (Bank of Thailand, 2017).

Figure 2. Volume of internet banking and mobile banking transactions (Bank of Thailand, 2017)

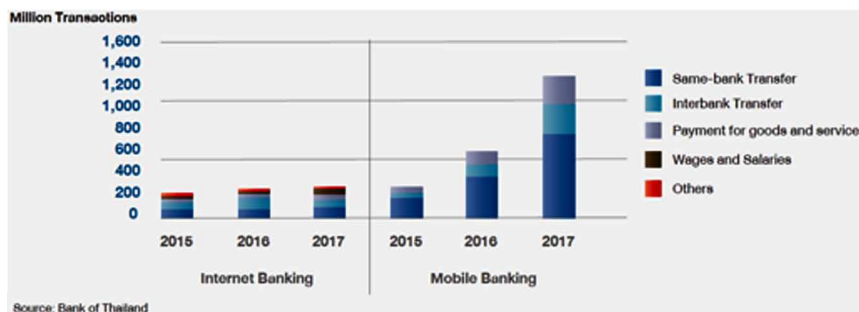
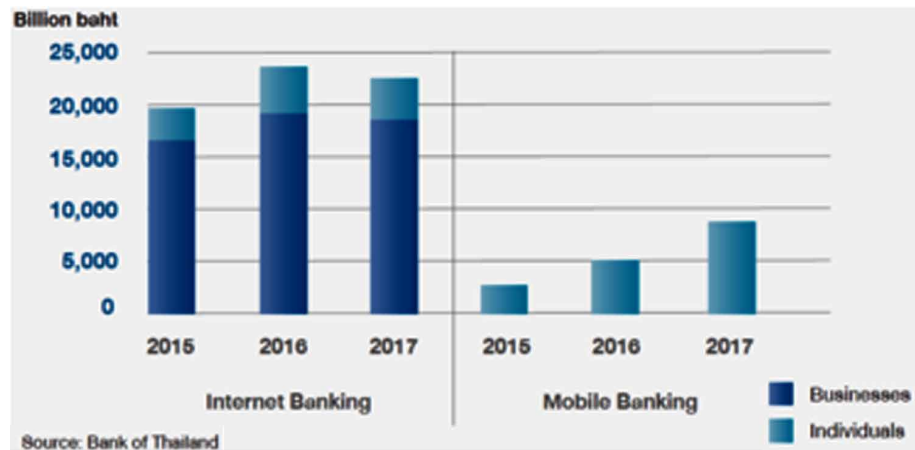


Figure 3 shows the value of internet and mobile banking transactions. Although mobile banking transactions had a higher growth compared to internet banking during 2015-2017, the value was significantly lower. This is due to the reason that the maximum transfer amount allowed per transaction for mobile banking (500,000 baht per transaction) is lower than which of internet banking (10 million baht per transaction). Therefore, internet banking was mostly used for business purposes.

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Figure 3. Value of internet banking and mobile banking transactions
(Bank of Thailand, 2017)



Boonsiritomachai & Pitchayadejanant (2017) investigated mobile banking adoption by Thai generation Y using UTAUT and TAM. The results show that facilitating conditions and security in mobile banking application have an indirect effect on behavioral attention via hedonic motivation while self-efficacy has both direct and indirect effect on behavioral attentions.

Cultural Considerations

Culture has long been recognized as an important factor shaping consumer behavior (Changchit et al., 2014). Culture has been defined by Matsumoto (1994) as the degree to which people share attributes, values, beliefs, and behaviors. The most popular definition of culture is Hofstede's, which defines culture as, "the collective programming of the mind which distinguishes the members of one group from another" (1984, p.21).

In his work, Hofstede (1984) identified four dimensions of culture. The first dimension is power distance, which is described as the extent that less powerful members of an organization accept that power is distributed unequally. The second dimension is individualism, which refers to the degree to which individuals emphasize self-interest over that of the group. The third dimension is that of masculinity, which attaches importance to goals such as career and material success versus social goals such as relationships and helping others. The fourth dimension is uncertainty avoidance, which addresses the degree to which people of a society feel uncomfortable with uncertainty and ambiguity. Table 1 below shows the comparison of these cultural dimensions between people in U.S. and Thailand.

As the globalization of business and systems continues, there is a need for studies on the cross-cultural adoption and use of information technology as cultural issues play a significant role in the development, design, and use of Information Systems (Hasan & Ditsa, 1999; McCoy et al., 2004). The national culture of IT development, operation, and use is important for the research on global information management (Markus & Soh, 2002). Effect of cultural differences on IT perception and use is studied from various perspectives. For instance, Kim et al. (2014) revealed that perceived usefulness, perceived risk, and trial ability are determinants of consumers' perception on the IT process in China, Korea, and Japan and are affected by different cultures.

Table 1. The comparison of cultural dimensions between U.S. and Thailand

	U.S.	Thailand
Power distance	40	64
Individualism	91	20
Masculinity	62	34
Uncertainty avoidance	46	64

(Hofstede, 1984)

Cultural difference is the significant factor that can limit the online activities such as the use of online searches or even blocking E-commerce activities (Bin et al., 2003). Different cultures reflect differing social norms and propensity to trust (Greenberg et al., 2008). Locally, usage of IT may be affected by different political systems (Elbeltagi et al., 2005). For global business, the integration of IT is recognized as a global competitive pressure. This challenge can be achieved by the cross-cultural study to gain more knowledge on the differences in value and attitude (Lippert & Volkmar, 2007). For instance, Rouibah and Hamdy (2009) revealed that curiosity can be one additional factor to the Technology Acceptance Model (TAM) for a study conducted in Kuwait. Gefen and Heart (2006) also found that trust and trust beliefs differ markedly in individualism, uncertainty avoidance, and power distance for subjects in Israel. The results showed that the effects of predictability and familiarity on trust beliefs might differ across national cultures.

Culture has been considered as a factor influencing IT adoption (Ein-Dor et al., 1993; Harvey, 1999; Palvia, 1998). Straub et al. (1997) found that the TAM could not predict technology usage across all cultures. The study examined the accuracy of TAM across three countries, Japan, Switzerland, and the U.S. and found that TAM could not explain subject's behavioral intention in Japan while the model was found to be a good explanation for IT use in Switzerland. The difference in these results was explained to be the influence of national culture. Results in another study also suggested that culture could impede IT implementation efforts because of differences in the way IT were interpreted and given meaning (Robey et al., 1989).

Cross country differences should be considered in the agenda of technology challenges (Malquias and Hwang, 2019). The differences in term of level of development of the country implies an effect on the variables that can facilitate or create obstacles to the adoption of new technologies. Malaquias and Hwang (2019) use 375 Brazillian students who are mobile banking user and 174 U.S. students who are the U.S. mobile user. They found that perceived usefulness and trust are among the main factors on explaining the mobile banking in Brazil.

Baker et al. (2010) conducted a study with Saudi subjects to examine the cultural effect on technology adoption behavior. The result reported that collectivist culture and the worker's focus on the managerial father figure influences the individual acceptance of technology. In addition, a study conducted by Srite et al. (2008) also revealed that cultural values significantly influence technological acceptance and use. Hung et al. reported that culture is an important element when choosing investment options in communication media and also revealed that respondents from the U.S. and Taiwan preferred different communication methods. Shin and Choo (2012) explored the cross-cultural effect on smart phone users in the U.S. and Korea. The results found that the two countries showed different value preferences as well as intention and adoption patterns. Brown et al. (2004) studied the Internet banking adoption in

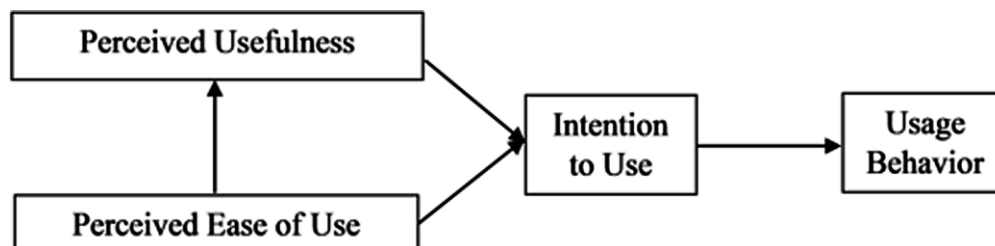
two countries, Singapore and South Africa. They concluded that attitude and behavioral control factors influenced consumer adoption of Internet banking but with differences in the number of determinants and the degree of influence of certain determinants. Susanto et al. (2013) conducted another cross-cultural study between subjects in Indonesia and Korea. The results revealed that Indonesians' use of Internet banking is strongly influenced by perceived security, while Koreans' use of Internet banking is strongly influenced by privacy concerns. In addition, trust and user satisfactions have a greater influence on loyalty for Indonesians while commitment has a greater influence on loyalty for Koreans.

THEORETICAL BACKGROUND

The Technology Acceptance Model (TAM) developed by Davis in 1986 (Davis et al., 1989) is derived from the Theory of Reasoned Action (TRA), developed by Fishbein and Ajzen (1975). The TAM was a big hit for modeling user acceptance of information systems (Bagozzi, 2007; Davis et al., 1989). The TAM model was proposed to address the question why users accept or reject information technology. The key purpose of TAM is to trace the impact of external variables on internal beliefs, attitudes, and intentions. The TAM suggests that two factors - perceived usefulness and perceived ease of use - are the two main factors in explaining system use. The TAM has several strengths, including its specific focus on information system use, its theory base of social psychology, and the validity and reliability of its instruments. Overall, the TAM has received widespread support based on a meta-analysis of 22 articles. The model is successful in predicting about 40% of a system's use (Legris et al., 2003). Lee et al. (2003) stated that TAM is considered the most influential and commonly employed theory for describing an individual's acceptance of information systems.

A review of prior studies suggested that the Technology Acceptance Model (TAM) was widely used to study users' acceptance of the new technology. Quite a few studies in many countries have widely used TAM to study the use of mobile banking. For example, studies took place in Iran by Hanafizadeh et al. (2014), in China by Song (2015) and Zhou et al. (2010), in Bahrain by AlSoufi and Ali (2014), in Korea by Gu et al. (2009), in Taiwan by Luarn and Lin (2005). The original TAM model is shown in Figure 4 below.

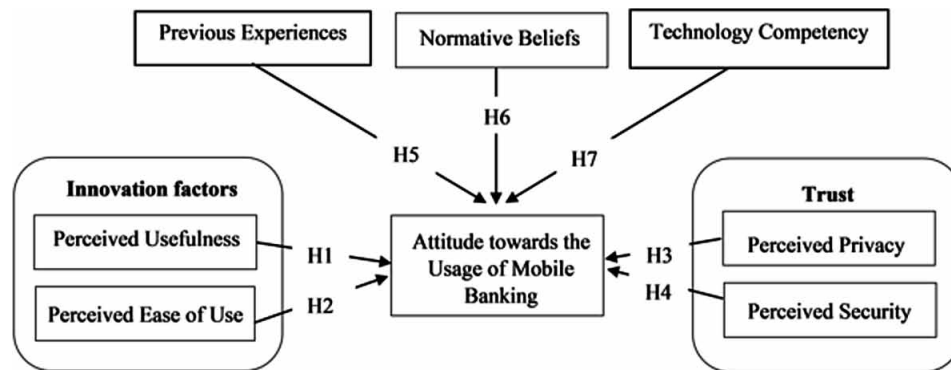
*Figure 4. Technology acceptance model (TAM)
(Davis, et al., 1989)*



RESEARCH MODEL

In this study, the TAM model was modified to fit within the context of mobile banking adoption. Five additional factors: (1) Perceived Security (PS), (2) Perceived Privacy (PP), (3) Previous Experience (PEX), (4) Normative Beliefs (NB), and (5) Technology Competency (TC) were examined in the proposed model. Despite many prior studies in mobile banking, this study provides several contributions to the literature. First, since smart phone technology has dramatically changed since the last five years, many mobile banking features have been either added or improved as well. Although some constructs in the proposed model were examined in the past, the findings may not be relevant nowadays. This research also extends the study of factors investigated in prior studies to include the factor “Previous Experiences”. It was hypothesized that consumers’ experiences on using mobile banking should influence their attitudes toward mobile banking adoption. Third, unlike prior studies that did not track whether subjects have used mobile banking before or not, subjects in this study contain only those who have experience using mobile banking before. Attracting potential customers and retaining existing customers is crucial to the long-term business success of mobile banking firms (Gu et al., 2009). The responses gathered from this target group of subjects should not only help banking services understand the needs of their customers in regard to the adoption of mobile banking but also help them improve the retention rate of their existing customers. The proposed research model is shown in Figure 5 below.

Figure 5. Research model and hypotheses



Factors Influencing Mobile Banking Adoption

In the proposed model shown in Figure 3, seven factors are investigated as potential determinants of consumers’ attitude toward the usage of mobile banking as follows: 1) perceived usefulness (PU); 2) perceived ease of use (PEU); 3) perceived privacy (PP); 4) perceived security (PS); 5) previous experiences (PEX); 6) normative belief (NB), and 7) technology competency (TC). Survey questions for this empirical research were compiled from previous studies (Alomaim et al., 2003; Changchit, 2006; Joines et al., 2003; Koivumäki, 2001; Koyuncu & Lien, 2003; Lin, 2003; Posnock, 2004).

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- **Perceived Usefulness of Mobile Banking (PU):** The construct perceived usefulness is defined as the prospective users' subjective probability that using a specific application system will increase his or her job performance within an organizational context (Davis et al., 1989). This factor has a significant effect on usage intention (Agarwal & Prasad, 1999; Davis et al., 1989; Venkatesh & Davis, 2000). Perceived usefulness is, thus, predicted to be a positive driver for the attitude towards the usage of mobile banking. A study conducted by Elbeltagi et al. (2005) reported that perceived usefulness significantly affected a decision support system (DSS) usage by senior managers in Egypt. Based on these discussions, the following hypothesis was proposed:
H1: Perceived usefulness (PU) positively affects the attitude towards the usage of mobile banking.
- **Perceived Ease of Use of Mobile Banking (PEU):** The construct perceived ease of use is defined as the degree to which the prospective user expects the target system to be free of effort (Davis et al., 1989). This factor plays a crucial role in understanding individual response to information technology (Agarwal & Karahanna, 2000; Chau & Hu, 2001; Hong et al., 2001). Research over the past decade provides evidence of the significant effect perceived ease of use has had on usage intention (Agarwal & Prasad, 1999; Venkatesh & Davis, 2000). Similar to the construct perceived usefulness, Elbeltagi et al. (2005) also revealed that perceived ease of use significantly affected a decision support system (DSS) usage by senior managers in Egypt. Therefore, it was posited that:
H2: Perceived ease of use (PEU) positively affects the attitude towards the usage of mobile banking.
- **Perceived Privacy of Mobile Banking (PP):** The concept of privacy is defined as a security principle that protects individuals from the collection, storage, and dissemination of information about themselves, and the possible compromises resulting from unauthorized release of that information (Forcht, 1994). Invasion of privacy is a situation in which someone tries to find out details about another person's private affairs in a way that is upsetting and often illegal. With mobile banking, invasion of privacy can occur in the form of hacking. Through recent advances in technology, hackers have the ability to use mobile banking to illegally access personal consumer information quicker and easier than ever before.

Concern regarding the responsibility of organizations to protect consumer privacy has become an increasingly major obstacle to the spread of E-commerce (Islam, 2014). It appears that many customers do not trust most websites enough to engage in "relationship exchanges," or the exchange of personal information (Liu et al., 2004). The construct perceived privacy can be defined as the possibility that companies collect data about individuals and use them inappropriately (Jarvenpaa & Todd, 1996; Roca et al., 2009). Zorotheos and Kafeza (2009) stated that a customers' willingness to transact online depended on their perceived privacy control (PPC). Privacy concerns are revealed to vary between different cultures. A study conducted by Dinev et al. (2006) revealed that Italians exhibit lower Internet privacy concerns than individuals in the U.S. Based on this reasoning, it is postulated that:

H3: Perceived privacy (PP) positively affects the attitude towards the usage of mobile banking.

- **Perceived Security of Mobile Banking (PS):** Security awareness is an important issue for all individuals who are dealing with sensitive data in everyday life (Changchit, 2008). Within the context of mobile banking, customers' perception of security depends largely on how confident a bank can make them feel their financial data is safe and secure. Yenisey et al. (2005) defined perceived security in E-commerce as the level of security users feel while they are shopping online. Flavia'n and Guinalí'u (2006) presented their view of perceived

security as a subjective probability with which consumers believe their personal information (private and monetary) will not be viewed, stored, and manipulated during transit and storage by inappropriate parties in a manner inconsistent with their confident expectations. Customers usually feel that the degree of risk is higher when performing transactions via the Internet (Black et al., 2001; Rotchanalitumnui & Speece, 2003). They worry that their money may disappear from their account without any trace.

Security has been studied and defined in several prior studies. Luarn and Lin (2005) reported that information security is one of the greatest concerns in the adoption of mobile banking. Roca et al. (2009) defined overall perceived security as a threat that creates a circumstance, condition, or event with the potential to cause economic hardship to data or network resources in the form of destruction, disclosures, modification of data, denial of service, and/or fraud, waste, and abuse. Therefore, it is postulated that:

H4: *Perceived security (PS) positively affects the attitude towards the usage of mobile banking.*

- **Previous Experiences with Mobile Banking (PEX):** Research indicates that consumers evaluate their online experiences in terms of perceptions regarding product information, payment, delivery, service, privacy and other such factors (Parasuraman & Zinkhan, 2002; Mathwick et al., 2001). Consumers will choose whether or not to continue future online transactions based on their past experiences (Shim et al., 2001). If the experiences have been positive, they will likely continue to initiate online transactions. Hung et al. (2012) reported that users' experience in Taiwan have a strong effect on National Healthcare Services Information Systems. Another study also revealed that shoppers experience influenced the amount spent on Internet purchases (Doolin et al., 2005). The following is the hypothesis for this factor:

H5: *Previous experience (PEX) positively affects the attitude towards the usage of mobile banking.*

- **Normative Beliefs (NB):** Normative beliefs represent the social pressures to perform certain behaviors (Ajzen, 1991). It can also be defined as an individual's perception about a particular behavior, which is influenced by the judgment of significant others such as parents, spouse, friends, teachers, co-workers, and the individual's boss. Hernandez and Mazzon (2007) stated that normative beliefs can be defined as the degree of disagreement among the opinions of key reference groups such as friends, peers or colleagues, superiors, and subordinates in an organizational environment.

According to a recent boom in public opinion and widespread use of new technology such as smartphones or tablet devices, people are influenced to adopt technologies used by their relatives and friends. This demonstrates that normative beliefs act as an important factor shaping the direction in which consumers do business. Sprott et al. (2003) stated that normative beliefs can lead to a socially desirable behavior in a specific situation, and should thus be included as a fundamental component of any predictive variables. For cross cultural results, social structure also plays an important role on explaining the adoption of IT. As reported by Kamal et al. (2013), the adoption of electronic implementation by the government (e-Government adoption) was affected by the existing social structure in Pakistan. Based on the foregoing, the following hypothesis was proposed:

H6: *Normative beliefs (NB) positively affects the attitude towards the usage of mobile banking.*

- **Technology Competency (TC):** Technology competency is defined as the extent to which an individual is knowledgeable about and effectively utilizes Information Technology to manage information (Tippins & Sohi, 2003). Typically, consumers with a high level of self-efficacy are more motivated to use technology-based services. Moreover, they have a more positive attitude and specific intent to use technology-based services than consumers with a low level of technology self-efficacy. Therefore, consumers with a high technology self-efficacy are expected to have positive attitudes and behavioral intentions to use mobile banking. For these reasons, consumers who are highly competent with technology are more likely to perceive mobile banking as easy to use than consumers who are less competent (Yang, 2010). We, therefore posit that:

H7: *Technology competency (TC) of subjects positively affects the attitude towards the usage of mobile banking.*

RESEARCH METHODOLOGY

Instrument Development and Pretest

The questionnaire designed for this study adapted the instrument and scales developed from TAM with additional constructs as described in the proposed research model (Venkatesh & Davis, 2000; Venkatesh et al., 2003). The questions used to measure other additional constructs were adapted from prior studies (Intana et al., 2013; Pikkarainen et al., 2004; Venkatesh & Davis, 2000; Vijayasathy, 2004; Wong & Hsu, 2008).

The questionnaire consisted of fifty-five (55) questions. Thirty-five (35) questions with the five-point Likert scale were designed to measure subjects' perceptions on mobile banking. One question (Question# 36) asked, "Overall, I prefer to do mobile banking transactions than other forms of banking" as a measurement for subjects' attitude on intention to use mobile banking. Another question (Question# 37) asks, "Have you ever used mobile banking?" to measure subjects' actual use of mobile banking. The remaining eighteen (18) questions were asked to gather some demographic data on the subjects. To validate the clarity of these questions, three professors and three researchers were asked to read through the survey questions. Revisions to the survey were made based on the feedback received (see Table 8 in Appendix A for the research questionnaire).

Data Collection

Surveys were distributed to students enrolled at a South-western United States university for the U.S. subjects and a Northern university in Thailand for Thai subjects during the fall and spring semester of 2015-2016 academic year. The researcher contacted the instructors to gain their consents to distribute the surveys in their classes. In the class, the researcher spent about ten minutes explaining the importance of the study and asked students to read each item carefully as their responses are very important to this study. Then, all students were provided with sufficient class time to respond to the survey. Students were informed that participation in the study was voluntary and that their responses would be kept anonymous.

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For subjects in the U.S., four hundred and forty-seven (447) subjects participated in this study. However, only three hundred and fifty-five (355) responses are valid. Of the three hundred and fifty-five (355) subjects, three hundred and nine (309) of them are mobile banking customers. The remaining forty-six (46) subjects have never used mobile banking before and thus have been removed from the data analysis. Subjects' demographics are shown in Table 2.

Table 2. U.S. subjects' demographics n = 309

	No.	%
Gender		
Male	139	44.98
Female	170	55.02
Age		
Under 18	0	0.00
18-24	237	76.70
25-34	56	18.12
35-44	14	4.53
45 and over	2	0.65
Smartphone		
Yes	301	97.42
No	6	1.94
No answer	2	0.65
Data Package on Smart Phone		
Yes	281	90.93
No	19	6.15
Not applicable	9	2.9
Heard About Mobile Banking		
Yes	307	99.36
No	1	0.32
No answer	1	0.32
Credit Card or Debit Card		
Yes	294	95.14
No	12	3.88
No answer	3	0.97
Online Purchase or Payment		
Yes	301	95.49
No	4	4.51
No answer	4	1.29

continues in next column

Table 2. continued

	No.	%
Use Internet Banking		
Yes	298	96.44
No	6	1.94
No answer	5	1.62
Employment Status		
Yes	208	67.31
No	101	32.69
Highest Education		
High school	174	56.31
Associates	2	0.65
Bachelors	89	28.80
Graduate	29	9.39
No answer	15	4.85
Student		
Undergraduate	243	78.64
Graduate	60	19.42
No answer	6	1.94
Area of Study		
Science and Technology	67	21.68
Health Sciences	49	15.86
Social Sciences	101	32.68
No Answer	92	29.77
Annual Income		
<15K	164	53.07
15K-30K	64	20.71
30K-45K	27	8.74
45K-60K	11	3.56
>60K	23	7.44
No answer	20	6.47

continues on following page

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Table 2. continued

	No.	%
Internet Use per Month		
None	0	0
1-5	6	1.94
6-10	12	3.88
11 and up	289	93.53
No answer	2	0.65
Make Purchase via the Internet on a Computer per Month		
None	14	4.53
1-5	213	68.92
6-10	46	14.88
11 and up	30	9.71
No answer	6	1.94
Make purchase via the Internet on a Smart Phone per Month		
None	54	17.48
1-5	194	62.78

continues in next column

Table 2. continued

	No.	%
6-10	30	9.71
11 and up	26	8.41
No answer	5	1.62
Perform Banking Transaction at the Bank Site per Month		
None	36	11.65
1-5	164	53.07
6-10	62	20.06
11 and up	43	13.92
No answer	4	1.29
Perform Banking Transaction via the Internet on a Computer per Month		
None	37	11.97
1-5	109	54.69
6-10	51	16.50
11 and up	46	14.89
No answer	6	1.94

For the Thai subjects, four hundred (400) subjects participated in this study. Of the four hundred (400) subjects, two hundred fifty-three (253) or 63.25% of them are mobile banking customers. The remaining one hundred forty-seven (147) or 36.75% of the subjects have never used mobile banking before and therefore have been disregarded from further analysis. Subjects' demographics are shown in Table 3.

Table 3. Thai subjects' demographics n = 253

	No.	%
Gender		
Male	91	35.97
Female	162	64.03
Age		
Below 18	1	0.40
18 - 34	200	79.05
35 - 44	50	19.76
above 44	1	0.40
No answer	1	0.40
Smartphone		
Yes	248	98.02
No	4	1.58

continues in next column

Table 3. continued

	No.	%
No answer	1	0.40
Data Package on Smart Phone		
Yes	226	89.33
No	23	9.09
Not applicable	3	1.19
No answer	1	0.40
Heard About Mobile Banking		
Yes	249	98.42
No	4	1.58
Use Credit Card or Debit Card		
Yes	203	80.24
No	50	19.76

continues on following page

Table 3. continued

	No.	%
Online Purchase or Payment		
Yes	243	96.05
No	10	3.95
Use Internet Banking		
Yes	238	94.07
No	14	5.53
No answer	1	0.40
Employment Status		
Yes	98	38.74
No	155	61.26
Student		
Bachelor	177	69.96
Master	74	29.25
Not a Student	2	0.79
Area of Study		
Science and Technology	52	20.55
Health Science	6	2.37
Social Science	195	77.08
Monthly Income		
Below 15,000 Baht	172	67.98
15,000 - 30,000	70	27.67
30,001 - 45,000	7	2.77
45,001 - 60,000	3	1.19
Above 60,000	1	0.40

continues in next column

Table 3. continued

	No.	%
Internet Use per Month		
None	1	0.40
1-5	3	1.19
6 - 10	7	2.77
11 and up	242	95.65
Make purchase via the Internet on a computer per month		
None	39	15.42
1-5	194	76.68
6 - 10	10	3.95
11 and up	10	3.95
Make Purchase via the Internet on a Smart Phone per Month		
Never	55	21.74
1-5	180	71.15
6 - 10	9	3.56
11 and up	9	3.56
Perform Banking Transaction at the Bank Site per Month		
None	40	15.81
1-5	186	73.52
6 - 10	13	5.14
11 and up	14	5.53
Perform Banking Transaction Via the Internet on a Computer per Month		
None	59	23.32
1-5	161	63.64
6 - 10	18	7.11
11 and up	15	5.93

DATA ANALYSIS AND DISCUSSION

Analysis of Measurement Model

In order to examine the internal consistency of the research instrument, a reliability test was conducted. The test confirms the reliability of the research items with Cronbach's alpha coefficient of 0.947 for the U.S. subjects and 0.946 for the Thai subjects.

The measurement model for the seven constructs was assessed by a confirmatory factor analysis with Varimax rotation in order to test whether the questionnaire items produced the expected number of factors and whether each item was loaded on their appropriated factor. Results from the factor analysis indicates that all items are loaded into six factors. As shown in Table 3, the result from the factor analysis reveals

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that the ten (10) questionnaire items designed to measure the perceived privacy and perceived security constructs are loaded into the same factor. We, therefore, combined the two factors and labelled it as the “Perceived Trust” (PT) factor. In addition, the factor loading of 0.1633 on item PU 2 for Thai subjects was below the threshold, indicating that this item should not be used to measure the PU factor, and thus was removed from the data analysis.

The measurement model was further assessed for construct reliability. The composite reliability for all the constructs was above .70, conforming to an acceptable threshold (0.7) suggested by Nunnally and Bernstein (1994). Table 4 presents the mean, standard deviation, factor loading, and composite reliability of all items assessed in this study.

Table 4. Summary of measurement scales

Construct	U.S. (n=309)				Thai (n=253)			
	M	SD	Factor Loading	Reliability	M	SD	Factor Loading	Reliability
Perceive Usefulness				0.741				0.758
PU 1	4.385	1.059	0.732		4.462	0.809	0.5963	
PU 2 (removed from Thai data)	3.340	1.213	0.479		3.565	1.131	0.1633	
PU 3	4.155	1.123	0.701		4.427	0.787	0.7412	
PU 4	4.553	0.846	0.483		4.609	0.762	0.7760	
PU 5	4.592	0.803	0.464		4.514	0.795	0.7318	
Perceived Ease of Use				0.906				0.908
PEU 1	4.472	0.913	0.688		3.806	0.890	0.7726	
PEU 2	4.304	0.925	0.765		3.972	0.852	0.7702	
PEU 3	4.294	0.977	0.731		3.834	0.893	0.7662	
PEU 4	4.440	0.879	0.650		4.040	0.835	0.8170	
PEU 5	4.087	1.091	0.580		3.957	0.874	0.7168	
Perceived Trust				0.936				0.943
PP 1	3.437	1.120	0.809		3.178	1.029	0.8218	
PP 2	3.608	1.090	0.821		3.182	1.050	0.8586	
PP 3	3.725	1.047	0.835		3.423	1.003	0.7985	
PP 4	3.699	1.164	0.635		3.419	1.042	0.7022	
PP 5	3.210	1.299	0.715		3.079	1.044	0.7651	
PS 1	3.634	1.019	0.709		3.182	0.903	0.7878	
PS 2	3.508	1.062	0.756		3.186	0.922	0.8024	
PS 3	3.327	1.179	0.760		3.202	0.919	0.7552	
PS 4	3.618	1.180	0.635		3.289	0.886	0.6738	
PS 5	3.718	1.048	0.743		3.277	0.892	0.8115	
Previous Experiences				0.913				0.906
PEX 1	4.168	0.959	0.715		3.866	0.885	0.6264	
PEX 2	4.197	0.969	0.762		3.917	0.889	0.7429	

continues on following page

Table 4. Contineud

Construct	U.S. (n=309)				Thai (n=253)			
	M	SD	Factor Loading	Reliability	M	SD	Factor Loading	Reliability
PEX 3	4.194	0.937	0.759		3.929	0.884	0.7656	
PEX 4	4.074	1.046	0.775		4.162	0.808	0.7227	
PEX 5	3.861	1.098	0.766		3.704	0.906	0.6174	
Normative Beliefs				0.823				0.768
NB 1	3.424	1.095	0.651		3.352	0.877	0.6546	
NB 2	3.340	1.150	0.680		3.213	0.977	0.5080	
NB 3	2.799	1.357	0.820		2.933	1.087	0.7882	
NB 4	3.275	1.263	0.722		3.727	1.004	0.5580	
NB 5	3.372	1.241	0.755		3.625	1.014	0.6593	
Technology Competency				0.785				0.866
TC 1	4.511	0.956	0.657		4.202	1.081	0.6617	
TC 2	4.573	0.809	0.733		4.403	0.838	0.7712	
TC 3	4.440	0.901	0.815		4.174	0.855	0.8715	
TC 4	4.314	0.975	0.778		4.273	0.831	0.8118	
TC 5	4.236	1.041	0.791		4.111	0.875	0.8298	

Rotation Method: Varimax with Kaiser Normalization.

As shown in Tables 5 and 6, a correlation analysis was conducted to test the relationship between each variable. The correlation between the attitude towards the usage of mobile banking (ATT) and its determinants ranged from 0.274 to 0.697 for U.S. subjects and from 0.357 to 0.675 for Thai subjects, indicating a high likelihood that these factors influence the attitude towards the usage of mobile banking. To ensure that there is no problem with multicollinearity, the Variance Inflation Factor (VIF) was also tested and reported along with the regression analysis (please see Table 6).

Table 5. Correlation matrix; U.S. subjects

Variable	PU	PEU	PT	PEX	NB	TC	ATT
PU	1						
PEU	0.640**	1					
PT	0.423**	0.482**	1				
PEX	0.541**	0.673**	0.573**	1			
NB	0.282**	0.237**	0.431**	0.260**	1		
TC	0.431**	0.545**	0.320**	0.433**	0.166*	1	
ATT	0.545**	0.635**	0.567**	0.697**	0.274**	0.423**	1

** p<.0001, * p<.01

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Table 6. Correlation matrix; Thai subjects

Variable	PU	PEU	PT	PEX	NB	TC	ATT
PU	1						
PEU	0.615**	1					
PT	0.266**	0.420**	1				
PEX	0.524**	0.608**	0.581**	1			
NB	0.343*	0.376**	0.514**	0.521**	1		
TC	0.424**	0.323**	0.130**	0.336**	0.282**	1	
ATT	0.468**	0.643**	0.598**	0.645**	0.542**	0.357**	1

** p<.0001, * p<.01

Model Testing Results

In order to validate the relationship of factors in the proposed research model, a multiple regression analysis was conducted to test the six (6) hypotheses. As mentioned above, H3 and H4 variables, which are perceived privacy (PP) and perceived security (PS), were grouped into one variable, which is perceived trust (PT), as suggested by the factor analysis results. The dependent variable in this test is the attitude towards the usage of mobile banking (ATT). The independent variables include perceived usefulness (PU), perceived ease of use (PEU), perceived trust (PT), previous experience (PEX), normative beliefs (NB), and technology competency (TC). The analysis controls for three subjects' demographics, which are gender (DGender), employment status (DEmploy), and areas of study (DStudy). Based on previous literature, these control variables are included in the model as they have a potential to influence the IT adoption (Guo & Zhang, 2010; Lippert & Volkmar, 2007; Trauth et al., 2008). DGender is assigned the value of 1 if the respondents are male and 0 otherwise. DEmploy is assigned the value of 1 if the respondents are employed and 0 if they are not employed. DStudy is assigned the value of 1 if respondents study in field of science and 0 otherwise. The regression equation was written as follows:

$$ATT_i = \alpha_0 + \alpha_1 PU_i + \alpha_2 PEU_i + \alpha_3 PT_i + \alpha_4 PEX_i + \alpha_5 NB_i + \alpha_6 TC_i + \alpha_7 DGender_i + \alpha_8 DEmploy_i + \alpha_9 DStudy_i + \varepsilon_i$$

The results from Table 7 show the R2 and Adjusted R2 of 48.4% and 46.8% respectively for U.S. subjects and 54.5% and 52.8% for Thai subjects, indicating that the factors investigated are suitable to explain the attitude towards the usage of mobile banking. The F-stat was reported to be at 31.11 for U.S. subjects and 32.37 for Thai subjects, both were significant at a 1% significant level. This also indicates that the combined factors are able to simultaneously explain the attitude quite well.

Regarding each variable factor, the results from the regression analysis showed noticeable differences between the determinants of mobile banking adoption in the U.S. and Thailand as follows:

- Perceived usefulness (H1): The result showed the significant effect of this factor on the attitude towards the usage of mobile banking for the U.S. subjects ($\beta = 0.214$, $t = 2.52$). However, this factor does not significantly influence the attitude of Thai subjects ($\beta = 0.115$, $t = 1.35$). This result

indicated that perceived usefulness played an important role in determining whether U.S. subjects will use mobile banking while it was not important to Thai subjects. The significance of perceived usefulness is also found in earlier studies (Hanafizadeh et al., 2014; Püschel et al., 2010).

- Perceived ease of use (H2): The result revealed that this factor significantly affected subjects' attitude towards the usage of mobile banking in both countries ($\beta = 0.277$, $t = 3.15$ for U.S. subjects and $\beta = 0.436$, $t = 5.73$ for Thai subjects). Consumers nowadays tended to live with an idea that all technology should require minimum effort to use it. This finding suggested that banks in both countries must ensure their target customers are aware that it is easy to use mobile banking. This result confirms the findings of some prior studies (Dasgupta et al., 2011; Sripalawat et al., 2011) but contradicts to some previous findings (Koenig-Lewis et al., 2010; Liébana-Cabanillas et al., 2016).
- Perceived trust (H3 and H4): This factor played an important role in determining subjects' attitude toward the usage of mobile banking for subjects in both countries ($\beta = 0.112$, $t = 1.69$ for U.S. subjects and $\beta = 0.144$, $t = 2.18$ for Thai subjects). Trust is always a major concern for any technology use. It is not surprising that the perception about trust should play an important role in whether subjects will use mobile banking. It is apparent that they are not willing to transact via a mobile device if the transaction is not considered safe and secured from unauthorized usage. This result confirms prior studies that perceived security plays a crucial role in explaining the mobile banking services adoption (Alalwan et al., 2017; Bhatt, 2016; Svilar & Zupančič, 2016). The result for both countries reveals that subjects are more likely to use mobile banking if they can trust that their banking transactions will be kept confidential and secure. The result suggests that banks in U.S. and in Thailand should consider educating their customers about the privacy and security of mobile banking transactions.
- Previous experiences (H5): The result revealed a strong relationship between this factor and subjects' attitude towards the usage of mobile banking for subjects in both countries ($\beta = 0.423$, $t = 5.40$ for U.S. subjects and $\beta = 0.241$, $t = 3.00$ for Thai subjects). The finding pointed out that subjects in both countries would be more likely to use mobile banking if they have a good experience with their previous mobile banking transactions.
- Normative Beliefs (H6): This factor did not significantly impact the attitude of subjects in the U.S., but appeared to be a significant factor for the attitude of Thai subjects ($\beta = 0.030$, $t = 0.56$ for U.S. subjects and $\beta = 0.170$, $t = 2.45$ for Thai subjects). This finding is consistent with prior studies showing that social norm is a determinant factor for mobile banking adoption (Bhatiasevi, 2015; Malaquias & Hwang, 2016; Puschel et al., 2010; Sripalawat et al., 2011; Yu, 2014; Kazi & Mannan, 2013). This result indicated that U.S. subjects' attitude on the use of mobile banking were not influenced by peers, family members, and other social factors. This finding may result from subjects' belief that banking transactions are high-risk activities and require serious measures of protection. In this situation, peers or social factors may have less influence on their attitudes toward the usage of mobile banking. In contrast, this factor was found to be of importance in encouraging Thai subjects to use mobile banking.
- Technology competency (H7): The result revealed that this factor did not have a significant effect on subjects' attitude toward the usage of mobile banking in both countries ($\beta = 0.063$, $t = 0.87$ for U.S. subjects and $\beta = 0.084$, $t = 1.31$ for Thai subjects). The finding suggested that users' ability in using technology did not play an important role in encouraging or discouraging them from adopting mobile banking. This finding contradicts with prior studies (Masrek et al., 2014;

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Malaquias & Hwang, 2016; Oliveira et al., 2014; Yu, 2014; Yadav, 2016) whose findings revealed that technology competency has a significant effect on attitude towards the usage of mobile banking. A possible explanation is that the majority of subjects in both studies are in the range of 18 to 24. Subjects in this age group tend to be highly competent in using technology and are typically not afraid of using new technology. For this reason, this factor does not play a significant role in determining whether subjects will use mobile banking or not.

The Variance Inflation Factors (VIF) for all factors range between 1.025 and 2.554 for U.S. subjects and between 1.070 and 2.284 for Thai subjects. All VIFs are not greater than 10, indicating that there is no problem of multicollinearity (Hair et al., 2009; Diamantopoulos et al., 2008).

Table 7. Relationship between factors and attitude towards the use of mobile banking

Ha	Independent Variables	U.S. Subjects; n = 309			Thai Subjects; n = 253		
		β	<i>t</i>	VIF	β	<i>t</i>	VIF
H1	PU	0.215 **	2.52	1.83277	0.115	1.35	1.9048
H2	PEU	0.277 ***	3.15	2.55430	0.436***	5.73	2.0218
H3, H4	PT	0.112 *	1.69	1.75887	0.144**	2.18	1.7356
H5	PEX	0.423 ***	5.40	2.25066	0.241***	3.00	2.2844
H6	NB	0.030	0.56	1.27133	0.170**	2.45	1.5714
H7	TC	0.063	0.87	1.47769	0.084	1.31	1.3863
	Gender	0.059	0.64	1.05806	-0.047	-0.52	1.1795
	Employment	-0.032	-0.33	1.02487	0.084	1.00	1.0702
	Areas of study	-0.086	-0.76	1.06196	-0.032	-0.31	1.1162
		U.S. Subjects			Thai Subjects		
		R-Square	0.484		R-Square	0.545	
		Adj R-Square	0.468		Adj R-Square	0.528	
		F-stat	31.11***		F-stat	32.37***	

*** Significant at 1% level

** Significant at 5% level

* Significant at 10% level

CONCLUSION

This study examined the mobile banking acceptance model in a comparative way in order to identify possible cross-cultural differences in behavioral intentions to adopt mobile banking between U.S. and Thai consumers. Although there are quite a few prior studies investigated the factors influencing the adoption of mobile banking (Afshan & Sharif, 2016; Lee et al., 2013; Lin, 2011; Nel & Boshoff, 2014; Staff, 2013), not many of them have explored the motivations for mobile banking adoption in a cross-cultural manner (Baptista & Oliveira, 2015; Yu & Chantatub, 2015). In particular, there is no prior study comparing consumers' attitude toward the usage of mobile banking between the U.S. and Thailand. The comparison between the U.S. and Thailand was chosen because both countries show a high percentage of mobile banking usage (64% in Thailand and 42% in the U.S.), as reported by Statista (2015).

In the research model, seven factors predicted to influence the attitude toward the usage of mobile banking were investigated and compared between the two nationalities. The factor analysis result suggested that the ten questions used to measure the factors perceived privacy and perceived security should be grouped into one factor, which was labeled perceived trust (PT).

The findings revealed that four factors: perceived usefulness, perceived ease of use, perceived trust, and previous experiences were determinants of mobile banking adoption for U.S. users. Although four factors were also found to significantly affect mobile banking adoption for Thai users, these factors differ from U.S.'s. The findings revealed that perceived ease of use, perceived trust, previous experiences, and normative beliefs are determinants of mobile banking adoption in Thailand.

For both nationalities, subjects who perceive mobile banking as easy to use and can be trusted generally show a positive attitude towards the usage of mobile banking. These findings conform to the study conducted by Malaquias and Hwang (2019) which compared subjects in Brazil and U.S. In addition, those who had good experiences in using this banking channel are more likely to report a positive attitude towards the usage of mobile banking. However, the technology competency did not appear to be a determinant of mobile banking for both nationalities. This similarity in the results may be due to the fact that both countries are two of the top ranked in mobile usage (Statista, 2015). Therefore, the IT competency may not be the main influencing factor to adopt mobile banking for people in both countries.

The results showed that the users in the two countries differ in the significance of two factors, perceived usefulness and normative beliefs, affecting the attitude toward the usage of mobile banking. For U.S. users, perceived usefulness plays a significant role in influencing their attitude about mobile banking. The results suggested that it is important to banks in the U.S. to educate their customers about the benefits of using mobile banking. In contrast, this factor did not impact Thai subjects' attitudes about mobile banking. This may be due to the fact that 77.2% of Thai consumers already use their mobile phones. As mobile phones are already integrated into daily life of Thai consumers, most of them realize the benefits of mobile banking. In addition, horrible traffic conditions in Thailand (National Statistical Office, 2014) also discourage them from visiting bank sites. For this reason, the perceived usefulness factor did not influence their attitude on mobile banking adoption.

It is also interesting to note that normative beliefs appears to be a significant factor influencing mobile banking adoption for Thai consumers, but not for U.S. consumers. Typically, banking transactions have been viewed as high-risk activities and require a serious mean of protection. This result pointed out that the influence from family members, peers, and social factors were perceived to be more important for Thai consumers than for U.S. consumers. The finding suggested that banks in Thailand could use this strategy to attract more mobile banking customers by investing more on social programs that affect the use of mobile phone banking. These results point out that culture plays an important role in explaining the mobile banking adoption. The findings confirm suggestions from other studies that culture should be considered in explaining the IT adoption (Chan & Lu, 2004; Kim et al., 2013; Niederman et al., 2012; Hung et al., 2012; Susanto et al., 2013).

The study results address the widely used technology acceptance model (TAM) and demonstrate that when the model is used on different culture settings, which some patterns are predominated, different results are expected. For strong social cultures as found in Thailand, national cultures predominate while in strong task cultures like in the U.S., professional cultures predominate (Karahanna et al., 2005). These findings lead to the following suggestions to practical implication.

PRACTICAL IMPLICATION AND LIMITATION

Mobile banking technology provides the essential capacity of banking transaction. This innovative technology has led banking activities to the new platforms using Internet and mobile phone. With this new platforms, competitive challenge faces by banking industry is questioned on how to induce bank customer to use the mobile banking. The findings in this study suggest factors that are crucial to the success of mobile banking adoption. In order to encourage customers to adopt mobile banking, the study reveals that before implementing this technology, a bank should educate their target mobile banking customers about the usefulness of mobile banking. This is especially true in the U.S. where this factor significantly influences mobile banking adoption. It is also important to ensure that their customers are aware that this technology is easy to use, and all transactions conducted via mobile banking are secure and will be kept confidential. Since customers' past experiences are important factors in determining whether they will use mobile banking, it will be crucial for a bank to gather feedback from their customer to ensure that they are informed about any bad experiences and thus be able to prevent it from happening again in the future. This implementation scheme can be applied to both countries since both countries share similar view of the positive influence of previous experiences on mobile banking adoption.

The result in this study also indicates that users' attitude on the use of mobile banking are not influenced by peers, family members, and other social factors for the U.S. customers. This may due to the uncertainty and high-risk associated with mobile banking transactions. However, peers, family members, and other social factors play important roles in explaining mobile banking adoption in Thailand. Therefore, banking institutions in Thailand may consider attracting more mobile banking customers via a social marketing channel such as Facebook or LinkedIn. The finding also reveals that users' ability to adeptly use technology does not play an important role in encouraging or discouraging users from adopting mobile computing. These findings are similar for both countries. Therefore, banks may not have to invest too many resources on these factors and can instead spend more money promoting the other four factors, which are more important to users

As in most empirical studies, there is an inherent limitation in this paper. The sample in this research was limited to subjects in two universities. The main reasons why students were employed as the subjects in this study are (1) students are no doubt the heavy users of mobile phone (i.e., 97.42% of US subjects and 98.02% of Thai subjects in this study have a smart phone) and (2) only those who currently use mobile banking are included in this study. Despite prior studies have proposed students as good surrogates to mirror typical consumers (Luo et al., 2010; Remus, 1986; Zhou, 2012), there might exist a threat to the external validity since they do not symbolize the entire population of mobile banking. So, to improve the generalizability of the findings, future research should consider expanding demographics to include non-student subjects and users in various countries. In addition, a future study could provide a more detailed investigation into which features of mobile banking are deemed necessary or unnecessary when deciding whether or not to adopt this technology.

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APPENDIX: RESEARCH QUESTIONNAIRE

Table 8.

Perceived Usefulness (PU)
It is less time consuming than doing transactions at bank sites
I usually get better transaction fees than doing transactions at bank sites
I usually get a faster service than doing transactions at bank sites
Mobile banking allows me to do transactions at any time
Mobile banking allows me to do transactions at my own pace
Perceived Ease of Use (PEU)
Learning to use mobile banking is easy for me
I find it easy to get mobile banking to do what I want it to do for my banking purposes
My interaction with mobile banking is clear and understandable
I find mobile banking easy to use
It is easier to use mobile banking than other forms of banking
Perceived Privacy (PP)
I believe that the mobile banking system will protect the privacy of my personal banking data
I believe that the mobile banking systems will not disclose my personal banking data
I believe that banks will keep mobile banking transaction confidentially
I am not afraid to do transactions via mobile banking
I am not afraid to lose my confidential data via mobile banking transactions
Perceived Security (PS)
Using mobile banking enables me to conduct transaction securely
Using Internet banking makes me believe that the existing regulations are sufficient to ensure that users are protected
Overall, I am not worried about the security of the mobile banking
I believe that my banks protect me from unauthorized charges
I believe that my transactions are secured
Previous Experience (PEX)
I am usually satisfied with the mobile banking services
My mobile banking transactions are always accurate
I usually have a good experience with mobile banking services
My transactions are always processed in a timely manner
I never feel disappointed with mobile banking

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Table 8. Continued

Normative Beliefs (NB)
People in my organization think that I should use mobile banking
My family thinks that I should use mobile banking
My friends influence my decision to use mobile banking
The image of the bank has influence on my using mobile banking
Using mobile banking makes me feel current in the trend
Technology Competency (TC)
I use computer everyday
I am not afraid of using technology
My ability to learn new technology is high
I am always interested in new technology
I enjoy working with technology
Attitude Towards the Usage of Mobile Banking (ATT)
Overall, I prefer to do mobile banking transaction than other forms of banking

Chapter 31

Profiling Mobile Service Customers in the Spanish Market

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ABSTRACT

This research aims to examine whether different user groups exist in the mobile services industry and to profile and characterize them in order to provide management recommendations for mobile service companies. To examine the users' behavior in the mobile services sector, customer segmentation by means of factor analysis and k-means cluster analysis is developed with data from 443 mobile service users. Further, a Manova test is conducted to confirm differences among the obtained user segments. Mobile service customers cannot be seen as a homogenous group, since different customer profiles coexist in the mobile service industry. More specifically, four user clusters emerge from the research findings, namely "pragmatic uninvolved," "satisfied savers," "prone-to-switch" users, and "service mavens," the "service mavens" being the most attractive segment for mobile service companies. A behavioral-based segmentation is developed to extend the understanding of customer behavior in the mobile services field.

INTRODUCTION

The mobile services sector is tremendously dynamic and fast growing, since over 6.0 billion people own and use a mobile device or a smartphone in year 2017, becoming an intensely competitive industry (Mobile Statistics Report, 2018). In fact, mobile devices offer a mobile computing platform with greater portability than other computing devices such as laptops and tablets (Barnes, Pressey, & Scornavacca, 2019). Furthermore, the evolving nature of this industry makes that mobile traditional service has evolved into advanced mobile services, which could be understood as those data services that have the look and feel of internet web pages, but are accessible through mobile devices and operating through telecommunication networks (Lopez-Nicolás, Molina-Castillo, & Bouwman, 2008). These advanced mobile services

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include texting, gaming, video, mobile internet, mobile commerce, located-based services or banking services and so on. Similarly, the increasing technological advances enable value-added mobile services offering functionality to users such as communication, social networking, multimedia entertainment and information (Hamka et al., 2014). Consequently, mobile services are being increasingly implemented and used and have a profound impact on individuals' lifestyle and everyday routines, given that customers save time and money and strongly benefit from the use of these advanced services (Casado-Aranda, Liébana-Cabanillas, & Sánchez-Fernández, 2018).

In addition, the booming use and development of mobile services has opened up new challenges for mobile service providers that need to understand their customers in order to respond to their dynamic use behavior. In this context, one practical approach to investigate the user behavior in this industry is through user segmentation and profiling. The present research addresses two main goals: first goal is to examine whether different customer groups exist in the mobile services industry; and the second research goal is to provide a comprehensive profile of each one of the identified customer groups.

LITERATURE REVIEW

Adoption of Mobile Services and Customer Behavior

An extant review of the literature on the mobile services use and adoption highlights models and theories that are commonly applied to examine the customer adoption and usage of mobile services. Some of these well-known theories are the *Technology Acceptance Model* (TAM) developed by Davis, Bagozzi and Warshaw (1989) or the *Information Systems Success Model* (ISSM) proposed by DeLone and McLean (2003). The TAM model (Davis, Bagozzi, & Warshaw, 1989) has been the most extended and used theory for examining the mobile services use and adoption. However, despite its great explanatory power of technology adoption, this model focuses on the technological perspective, but does not incorporate the potential influence of behavioral factors (Wang & Li, 2012). Likewise, the *Information Systems Success Model* (DeLone & McLean, 2003) identifies the most relevant factors of quality of information systems and technologies but does not incorporate individual or behavior elements.

While at first mobile services served mostly as a voice communications service, the mobile service providers have developed into a hub of multimedia products. Today, through mobile services, mobile users can gain instant access to a tremendous amount of information on the internet anywhere and anytime, without temporal and spatial constraints (Zhou, 2012). For this reason, authors such as Wang and Li (2012) have defined mobile services as digital services added to mobile networks other than voice services, including texting, short message services, applications, games, entertainment, software applications and other functions in order to achieve specific purposes. In addition to capturing the voice communications segment, mobile services also compete for sophisticated data and internet, and mobile devices have evolved from conventional devices to smart devices accessing the internet and operating like personal computers. Accordingly, new mobile services are being released constantly, the service demand is very heterogeneous (Zhou, 2012), and the consumption patterns are continuously evolving.

On the other hand, mobile services are a technology-based industry, with attributes such as *usability*, *ubiquity*, *convenience* and *personalization* (Wang & Li, 2012). According to Venkatesh, Ramesh and Massey (2003) the term *usability* can be defined as the extent to which a given technology can ensure a positive user experience; and in turn, satisfy the individual functional and sensory needs. Similarly, the

attribute of *ubiquity* refers to the ability of mobile services to enable individuals to receive information and develop transactions from anywhere and anytime, on a real-time basis (Clarke, 2001). Therefore, through mobile devices, individuals can be reached anytime, regardless of their real location, which makes it possible the delivery of time-sensitive information. Likewise, the *convenience* provided by mobile services is related to the accessibility and agility provided by mobile devices, which eliminate the constraints caused by place and time. Finally, the attribute of *personalization* is related to the mobile service operator providing individual customers with tailored services, based on a deep understanding of their preferences and needs (Mulvenna, Anand, & Buchner, 2009). Further, personalization could be defined as the use of mobile-based technologies to provide personalized services to meet the specific needs of a particular customer (Ko, Kim, Li, 2009).

Mobile Service Market Segmentation

According to the seminal work of Smith (1956), market segmentation involves viewing a heterogeneous market as a number of homogeneous smaller markets with different preferences, needs and wants. Similarly, Reynolds (2006) defined market segmentation as identifying homogeneous groups or segments in the marketplace that respond consistently and predictably to variations in the marketing-mix elements. Thus, the main goal of market segmentation is to understand the common characteristics and motivations of each identified group.

Following Kotler, Armstrong and Cunningham (2005) there are several ways to segment a market. In the first place, the *geographic* segmentation is based on dividing the market into different geographical areas. In the second place, the *demographic* segmentation is based on age, gender, family size and so on. Third, the *psychographic* segmentation is based on the social class, lifestyle, attitudes, values and/or personality characteristics of the individual; and finally, the *behavioral* segmentation is based on occasion segmentation, benefit segmentation, loyalty status, or user status.

Customer segmentation in mobile services is typically based on socio-demographic, economic or psychographic variables. While segmentation models based on socio-demographic factors do not sufficiently explain differences in customer behavior; psychographic factors give more actionable basis for segmentation. However, the psychographic segmentation is not as popular in the mobile services industry (Hamka et al., 2014).

Most of previous research on customer segmentation in the mobile services industry focuses on mobile services in general terms, and on the services that customers use (Sell, Walden and Carlsson (2011). Authors such as Antonie (2003) identified six customer segments in the mobile service market developing psychographic segmentation, namely the *uninvolved* users, the *new life harmony* users, the *voice as a link*, the *adopters*, the *intense* users and the *forerunners*. Similarly, Bjorksten, Pohjola and Kilkki (2007) described four user segments, based on the service perceived value and the profitability for mobile service companies: *explorers*, *connected* users, *achievers* and *seekers*. Likewise, Mazzoni, Castaldi and Addeo (2007) developed a cluster analysis related to mobile device attributes, motivations of use, and lifestyles. They described three segments: *techno-fun* users who use advanced mobile services; the *value-driven* users who value the costs and quality of the service provided; and the *basic* users, who strongly value practical aspects of mobile services. Later, Sell, Mezei and Walden (2014) developed a segmentation analysis based on attitudes and differentiated three segments, namely *conservative* users, *medium* and *innovative* users.

In the present research the mobile service users will be segmented based on the benefits desired by users when using mobile services, as well as on behavioral variables; so, this study develops a behavioral segmentation research. This segmentation approach is best suited to identify consumption/behavior patterns and to create a consumer typology.

Benefits and Behavioral Outcomes in Mobile Services

Value for Money

Customer value is often defined as the consumer's overall assessment of the utility of a product or service based on perceptions of what is given and what is received (Zeithaml, 1988). Further, the customer value could be examined following two approaches. On one hand, the *unidimensional* approach is based on the price perception or the trade-off between customer sacrifice and perceived quality (Dodds & Monroe, 1985). On the other hand, the *multidimensional* approach comprises different value dimensions, such as price or value for money, functional value, emotional value or social value (Sweeney & Soutar, 2001). More precisely, the *value for money* or the *monetary value* is defined as a type of value which is measurable in terms of the monetary benefits and costs involved in purchasing or using the services (Sweeney & Soutar, 2001). While the monetary costs are all those costs that customers have to bear in exchange for the product or service; the monetary benefits are those monetary savings in the form of price reduction when purchasing a product or service (Zeithaml, 1988). According to Kumar and Reinartz (2016), the perceived value represents the aggregation of benefits that the customer is seeking, expecting, or experiencing, as well as the possible undesired consequences resulting from them (Kumar & Reinartz, 2016). In the present research the value for money is considered as the benefits that customers obtain by subscribing the mobile services offered by a specific service operator, which is deemed to be reasonably priced, affordable and offering good value for money.

In fact, the perceived value offers a basis for understanding user behavior in the context of e-services (Li & Mao, 2015) and mobile services (Shaikh & Karjaluo, 2016). Previous research reports that the intense competition in the mobile services industry has resulted in a decrease of prices (Baker, Sciglimpaglia & Saghafi, 2010). In fact, the mobile service companies' pricing strategies clearly represent the most important driver of competition in a context where the mobile services offered by companies have been quite homogenous during the evolution of this industry (Corrocher & Zirulia, 2010). Therefore, it can be stated that what mostly drives competition in this sector is not the provision of new voice or data services, but most prominently in the development of new tariff plans. Similarly, authors such as Haque et al. (2007) indicate that service price and promotional offers play a key role in the selection of a telecommunication service provider by consumers. However, in this sector, there are only slight differences in the mobile packages offered by all the mobile service operators; and in turn, customers expect to receive additional benefits as a result of engaging in long-term relationships with their service providers (Gwinner, Gremler, & Bitner, 1998).

Corporate Image

According to Grönross (1988) the corporate image could be defined as the perception of a company or organization held in the consumer memory, which influences the perception of the company activity; so that the corporate image reflects the customer's overall impression and mental image of the company.

Similarly, Lai, Griffin and Babin (2009) report that corporate image stems from all the consumer's consumption experiences, being a key factor in the overall service evaluation.

However, as technology advances, customers find it difficult to evaluate the quality differences among mobile service companies; and in this context, the company corporate image can represent the quality of fundamental functions and services provided (Kim & Yoon, 2004). Further, in the mobile services market, customers cannot fully regulate the service subscription contract, so it is necessary for them to rely and trust in service providers, thus being the corporate image a relevant factor for customers to perceive a mobile services company as reliable and trustworthy (Deng et al., 2010). Finally, previous research shows that a positive corporate image influences user satisfaction (Clung et al., 2016; Su et al., 2016).

Attractiveness of Alternatives

In the context of services marketing, the concept of *attractiveness of alternatives* is defined as the quality of service that the customer anticipates in the best available alternative to the present service provider (Patterson & Smith, 2003). Moreover, the attractiveness of alternatives could be understood as customer perceptions regarding the extent to which competing alternatives are available in the marketplace (Jones, Mothersbaugh and Beatty, 2000). Therefore, the lower the perceived attraction of competing companies as alternatives, the lower the likelihood that customers will leave their current company (Kim et al., 2018).

In the mobile communication services industry the attractiveness of alternatives is related to the image, reputation and service quality of the replacing service companies, which are expected to deliver superior services than those of the current provider (Kim, Park, & Jeong, 2004). Finally, it should be noted that the availability of attractive alternatives in the mobile service market is one of the main reasons for customers switching service providers (Kim, Park, & Jeong, 2004). So, when customers perceive few attractive alternatives, or when customers are simply unaware of other attractive alternatives or have great difficulty in finding alternative service providers, this will favor customer retention (Lam et al., 2004).

Search Effort

The search effort is related with the individual's tendency to seek out information about a product category or service. Search costs are present in mobile services because customers need to spend time and search effort to gather information about service providers before subscribing the contract (Lu, Tu, & Jen, 2011). For this reason, a great search effort acts as a switching cost, leading to low customer satisfaction and high customer loyalty (Kim, Park, & Jeong, 2004). However, authors such as Lopez-Nicolás, Molina-Castillo and Bouwman (2008) indicate that the potential users of mobile services may feel that adopting these services and technologies does not require much effort.

Satisfaction

The concept of satisfaction could be defined as an evaluative post-experience or post-consumption judgement (Oliver, 1997); and in turn, customer satisfaction could be conceptualized as an experience-based overall evaluation made by consumers. Similarly, consumer satisfaction can be defined as a cognitive evaluation of the product or service's perceived performance compared with the expectations of the individual (Oliver 1999). So, if the perceived performance matches the customer expectations, customers will be satisfied; and if it does not, then customers will be dissatisfied.

Additionally, other authors like Edward, George and Sarkar (2010) indicate that there are two different conceptualizations of customer satisfaction: a transaction-specific satisfaction related to each transaction; and a cumulative satisfaction, meaning an evaluation based on the overall consumption experiences. Later, regarding the service context, Hu, Kandampully and Juwaheer (2011) define customer satisfaction as a cognitive or affective reaction that emerges in response to a single or a prolonged set of service encounters. In this study customer satisfaction is assumed as the overall evaluation and customer perception when using the mobile services contracted with a specific provider.

In the context of mobile services the user satisfaction is strongly related to quality (Gao, Waechter, & Bai, 2015), a good value for money relationship, efficient customer services and convenient procedures (Lee, Lee, & Freick, 2001), as well as with service responsiveness, reliability and the perceived network and call quality (Seth, Momava, & Gupta, 2008). Likewise, in the mobile services industry, customer satisfaction reflects the degree of a customer's positive feeling for a mobile service provider (Deng et al., 2010). Therefore, when a customer has a good experience with a mobile service operator, customer satisfaction will be developed and this customer is more likely to remain with this service provider, maintaining the subscription (Deng et al., 2010), since satisfaction is directly connected to the continuance use of services from a specific mobile service provider (Chung et al., 2016; Kim et al., 2018).

Loyalty

Customer loyalty can be conceptualized as a deep held commitment to rebuy or repatronize a preferred product or service consistently in the future; therefore, entailing a repetitive purchasing despite situational influences or marketing efforts which have the potential to influence switching behavior (Oliver, 1999). More precisely, service loyalty can be defined as a favorable attitude towards a specific service provider that consists of two dimensions, namely the repurchase likelihood, and the price tolerance towards the provider's price and towards other competitors' pricing (Fornell et al., 1996).

A large part of the mobile service provider's effort is aimed at creating and maintaining loyalty among its customer base, since customer loyalty is a key factor in reducing the churn rate (Kuo, Wu, & Deng, 2009). In fact, loyalty positively influences different behavioral outcomes, such as customer retention, repurchase, long-term customer relationships and company profits. Similarly, in the mobile services industry high levels of customer satisfaction, and mobile value-added services increase customer loyalty and service continuance intention (Kuo, Wu, & Deng, 2009), as well as the repurchase intentions (Wang & Liao, 2008). On the other hand, authors like López-Miguens and Vázquez (2017) report that customer loyalty could be determined by switching barriers and high switching costs.

Involvement

According to Zaichkowsky (1985) the concept of involvement can be conceptualized as the individual's perceived relevance of an object based on inherent needs and values. More precisely, the concept of involvement is defined in the marketing area in terms of the importance and interest evoked by a stimulus; so that higher involvement levels relate to higher levels of personal motivation and search from individuals (Blackwell, Miniard, & Engel, 2006). Consequently, the level of consumer involvement with an object has shown to influence the information search and the decision making (Petty & Cacioppo, 1984); and in turn, individuals involved in a product or service, often want to spend time, effort, energy and money in the service, while finding the service quite important. Likewise, involvement can be understood as

the enthusiasm and excitement that customers feel for a specific product or service domain (Lyons & Henderson, 2005). Finally, regarding mobile devices previous research reports that as devices and platforms become increasingly sophisticated, they have a greater capacity to encourage user engagement and involvement (Barnes, Pressey, & Scornavacca, 2019).

Switching Intention

It is common for customers to be dissatisfied with the relationship they have with their service providers, and in this situation while some customers take no action when being dissatisfied, other customers take actions such as switching suppliers (Richins, 1987). More precisely, customer switching intention could be defined as the customer decision to terminate the contract with a particular service company. In the mobile services industry customer retention is a crucial issue (Deng et al., 2010). The reason is that mobile communication services have the characteristics of typical contract services, representing a continuous contractual transaction in which most subscribers sign contracts over a specific period length to service providers due to some benefits (Kim et al., 2018). In this context satisfaction and loyalty have emerged as strong influences on customer retention, which means that a customer continues a contract with a service provider (Jones, Mothersbaugh, & Beatty, 2000).

One of the main reasons for customers switching service providers is switching costs, which may determine the customer switching intention (Burnham, Frels, & Mahajan, 2003; Kim et al., 2018). More specifically, these potential costs may constitute a significant barrier to change to another service provider when the customer is dissatisfied. Therefore, if high switching costs exist or are perceived, customers are more likely to retain their existing companies rather than leave for other providers (Kim et al., 2018). Switching costs could be defined as the customer's perceived costs of switching from the existing to a new supplier (Heide & Weiss, 1995); which include the cost of changing services in terms of time, monetary and psychological expenditure (Dick & Basu, 1994). Likewise, other type of switching costs is the *uncertainty costs* that are those costs associated with the psychological uncertainty that accompanies an untested new service provider (Guiltinan, 1989).

Regarding the mobile services industry, authors such as Corrocher and Zirulia (2010) report that switching costs could be both exogenous and endogenous. On one hand, the *exogenous* switching costs are mainly associated with the lack of number portability, meaning that the customer changes his/her phone number when changing the mobile operator, and then needs to communicate the new number to habitual contacts; thus creating a great cost. Conversely, the *endogenous* switching costs emerge because mobile service companies try to implement artificial network externalities, such as on-net tariffs, which mean that calling customers who use the same operator is cheaper (Corrocher & Zirulia, 2010). Finally, it should be noted that switching mobile service providers is quite common and available. Customers are often provided with financial incentives to switch mobile service provider, such as for example the offering of subsidized advanced handsets and mobile devices in combination with new subscriptions (Lopez-Nicolás, Molina-Castillo, & Bouwman, 2008). And according to García-Mariñoso and Suárez (2019) once number portability is guaranteed, customers would be expected to switch their mobile supplier to obtain the best deal.

METHODOLOGY

Sampling and Fieldwork

A survey was developed based on an extensive literature review on user behavior in the mobile communication services industry. The research questionnaire was designed to identify the benefits sought and behavioral outcomes of users when using their mobile communication services. More precisely, the participants' responses pertained to the mobile communication service provider they use; that is, they were asked about their actual mobile service provider.

Data were collected in June 2016 through a self-administered web-based structured questionnaire among mobile service users residing in the Spain through random sampling. The research participants were asked to rate the variables related to their usage behavior and benefits sought on a 5-point Likert-type scale ranging from 1="completely disagree" to 5="completely agree"; and the last section of the questionnaire included questions regarding socioeconomic and demographic characteristics. A total amount of 497 questionnaires were collected, obtaining a total amount of 443 valid responses. The random error was a 4.75%, assuming the maximum indetermination hypothesis ($p=q=50$) and the confidence level 95%.

Variables and Scale Development

Previous research was considered in order to select the measurement variables and indicators. In the first place, the *value for money* provided to service users was measured using the scale from Kuo, Wu and Deng (2009). Secondly, the mobile service companies' *corporate image* was examined through a two-item scale adapted from Deng et al. (2010); while the *attractiveness of alternatives* in the mobile services industry was gauged with a two-item scale adapted from Patterson and Smith (2003). Then, the customers' *search effort* was measured using the items proposed by Bigné, Sanchez-García and Currás-Perez (2011). Similarly, the involvement with the service was measured through a 3-item scale proposed by Swilley and Goldsmith (2007); while the customer *satisfaction* was examined through a four-item scale adapted from Oliver (1999). Likewise, in order to measure customer *loyalty*, a three-item scale was adapted from McMullan (2005). Finally, in order to measure consumers' *switching behavior* the scale proposed by Bansal, Taylor and James (2005) was adopted (Table 1).

DATA ANALYSIS

Methodology

The methodology developed in the present research includes four different methods. In the first step, a principal component analysis is performed on the research data in order to identify the factors underlying the users' behavior. In the second step, a confirmatory factor analysis (CFA) is developed to confirm the validity of the factor model.

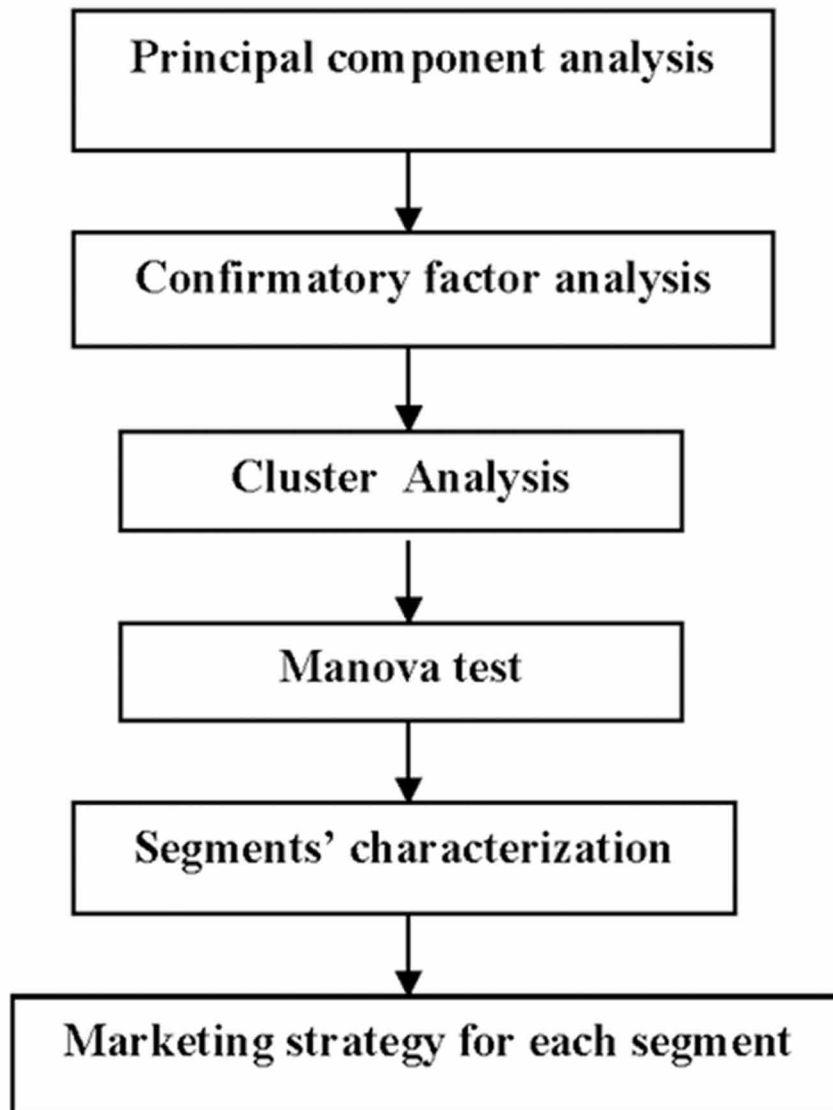
In the next step, a two-step cluster analysis is conducted using the obtained factors as the input variables. This clustering technique was used, given that it allows testing similarities and associations between segments without making any assumption on the final number of clusters. Then, to confirm that the different clusters emerged in the cluster analysis present different profiles, a MANOVA test is

conducted to examine significant differences between them. In the next step, the obtained user clusters are characterized based on the benefits sought when using mobile services, the usage behavior and socioeconomic and demographic variables. Finally, a comprehensive characterization of each user segment is provided, as well as some managerial recommendations for marketing management in the mobile service market (Figure 1).

Table 1. Sample description.

VARIABLE	CATHEGORY	Frequency	Percentage
Age	Less than 20 years	34	7.62%
	21-30 years	277	62.6%
	31-40 years	84	18.87%
	41-50 years	44	9.9%
	Older than 50	4	1.02%
	Total	443	100.00
Gender	Male	184	41.42%
	Female	259	58.58%
	Total	443	100.00
Household Average Income level (Euros / Year)	6,000-12,000	15	3.3%
	12,000-18,000	141	31.82%
	18,000-24,000	89	20.0%
	24,000-30,000	89	20.0%
	30,000-36,000	49	10.97%
	36,000-42,000	28	6.42%
	More than 42,000	32	7.47%
	Total	443	100.0
Education Level	Did not complete primary education	-	-
	Primary education	41	9.32%
	Secondary education	117	26.35%
	University studies	275	62.05%
	Ph.D. Doctoral studies	10	2.27%
	Total	443	100
Frequency of mobile services usage	Daily/Many times per day	407	91.89%
	Several times per week	26	5.94%
	Once a week	6	1.35%
	Several times per month	2	0.54%
	Occasionally	1	0.27%
	Total	443	100

Figure 1. Methodological work



Principal Component Analysis

In the first place in order to determine whether different factors could be grouped under general characteristics a principal component analysis was carried out (Hair et al., 1998). Eight major factors with eigenvalues of 1 or more were identified through Varimax rotation, and items with rotated factor loadings of 0.50 or higher were retained, jointly accounting for 79.96% of the cumulative variance; while three items with factor loadings lower than 0.50 were removed from the initial scale, namely IMG1, ATR3 and INV1. Additionally, the measures of sampling adequacy indicate that the correlation matrix for a 23-item scale is suitable (Test of Bartlett's Sphericity: $X^2=8882.751$; $df=325$; $p<0.000$) and the Kaiser-Meyer-Olkin criterion shows a value of sampling adequacy of 0.940. Finally, the factors derived from

the principal component analysis were named as “value for money”, “corporate image”, “attractiveness of alternatives”, “search effort”, “involvement”, “satisfaction”, “loyalty” and “switching behavior” as shown in Table 2.

Confirmatory Factor Analysis

A confirmatory factor analysis was conducted to find the validity of the eight-factor model using Amos 18.0 software. A satisfactory measurement model fit was obtained ($X^2=717.434$; goodness of fit index GFI=0.874; root mean squared error of approximation RMSEA=0.066 and root mean residual index RMR=0.053).

Table 2. Variables and indicators

VARIABLES	INDICATORS	Factor Loadings	Cronbach Alpha	CR	AVE
VALUE FOR MONEY Kuo et al. (2009)	VM1: My company offers affordable services VM2: My company offers a good quality-price relationship VM3: My company provides me with multiple benefits VM4: This mobile service company provides value-added services which are worth for me	0.784 0.867 0.838 0.886	0.910	0.908	0.713
CORPORATE IMAGE Deng et al. (2010)	IMG2: This company has a good image, compared to other mobile service companies IMG3: This company has a good image among customers	0.848 0.919	0.876	0.877	0.782
ATTRACTIVENESS OF ALTERNATIVES Patterson & Smith (2003)	ATR1: Probably, I would be also satisfied with another mobile service company ATR2: There are other good companies to choose from in this sector	0.921 0.693	0.772	0.841	0.730
SEARCH EFFORT Bigné et al. (2011)	SEAR1: I reviewed great amount of information before contracting mobile services SEAR2: I visited and compared numerous companies before I selected my mobile services company SEAR3: I spent a lot of time searching for information about mobile services' before I selected my company	0.752 0.758 0.915	0.850	0.852	0.626
INVOLVEMENT Swilley & Goldsmith (2007)	INV2: Mobile services are important to me INV3: I have a great knowledge about mobile service INV4: This service strongly influences my life	0.728 0.870 0.692	0.788	0.823	0.612
SATISFACTION Oliver (1999)	SAT1: I'm satisfied with this service SAT2: This company meets my needs perfectly SAT3: This company gives me the service I expect from a mobile service company SAT4: My overall satisfaction with the service provided by this company is...	0.869 0.816 0.855 0.896	0.918	0.919	0.739
LOYALTY McMullan (2005)	LOY1: If I had to contract mobile services again, I would chose the same company LOY2: I consider myself loyal to my mobile services company LOY3: I will continue my subscription to my company	0.889 0.912 0.866	0.916	0.919	0.791
SWITCHING BEHAVIOR Bansal et al. (2005)	SWIT1: I have the intention to switch my mobile services company SWIT2: I regret to have subscribed the contract with this company	0.784 0.722	0.723	0.724	0.569

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To evaluate the convergent validity the standardized factor loadings were considered, indicating values closer or higher than the acceptable threshold of 0.70 (Hair et al., 1998). Then, to examine the reliability of the measurement scale the Cronbach Alpha values were estimated. Considering that all constructs have Cronbach Alpha estimates greater than 0.70, and that all of the composite reliability (CR) values are above 0.70, constructs were deemed satisfactory (Hair et al., 1998). Similarly, the average variance extracted (AVE) was calculated for each of the constructs to evaluate the convergent and discriminant validity of the scale. The AVE values ranged from 0.569 to 0.791 which indicated an adequate convergent validity of the measurement model (Hair et al., 1998). Finally, the discriminant validity of the scale was also supported, since the square root of the average variance extracted (AVE) values of any pair of constructs shows greater values than the correlation estimate between these two constructs (Fornell & Lacker, 1981) as depicted in Table 3. Therefore, the 23-item scale could be considered reliable and valid.

Table 3. Correlation matrix among constructs

	Correlation coefficients							
	VM	Corp.	AA	Sear.	Inv.	Sat.	Loy.	Switch.
Value for money	0.844							
Corporate image	0.675	0.884						
Attract. alternat	-0.535	-0.501	0.854					
Search effort	0.206	0.184	-0.138	0.791				
Involvement	0.327	0.282	-0.079	0.492	0.782			
Satisfaction	0.629	0.663	-0.557	0.223	0.301	0.859		
Loyalty	0.723	0.661	-0.600	0.189	0.257	0.664	0.889	
Switching intention	-0.693	-0.652	0.664	-0.062	-0.222	-0.709	-0.529	0.754

Note: the diagonal values in bold represent the square root of the average variance extracted of each construct.

Cluster Analysis

The mobile service users are grouped through a two-step cluster analysis method using SPSS software. More specifically, in the first step the Ward's hierarchical clustering method with squared Euclidean distances was used to obtain the potential user segments (Hair et al., 1998); and the results indicated that a four-cluster solution was the most appropriate. In the next step, a k-means clustering procedure was developed on the four-cluster solution, based on the previous hierarchical clustering, showing a correct classification rate of the 87.9%. Finally, an Anova test indicated that the segmentation derived from the cluster analysis was valid, since the F-ratios revealed that the clusters differ significantly among them. The four-cluster solution obtained included 77 individuals in Cluster 1; 107 individuals in Cluster 2; 105 individuals in Cluster 3; and 152 customers in Cluster 4.

Manova Analysis

Considering the segments obtained from the previous cluster analysis, a MANOVA test was conducted to confirm the differences among segments; and for this purpose, a MANOVA analysis was run on the

entire set of variables. The obtained results indicate that the four clusters differ significantly in their behavior (Hotelling's $T^2=7.187$; $F=37.839$, $p=0.000$). Similarly, the multivariate test using Pillai's Trace and Wilks' Lambda were developed; and the values obtained for Pillai's Trace= 1.537 , $F(78, 16.735)$, $p=0.000$; and Wilks' Lambda= 0.060 , $F(78, 24.776)$, $p=0.000$, respectively were adequate. Finally, the post-hoc Tuckey multiple-comparison tests revealed significant differences among the four segments for the behavioral variables at the 95% confidence level (Table 4).

Table 4. Mean values for four-cluster group solution and Tuckey test

Variables	Indicators	Cluster Means				Tuckey test	
		Pragmatic uninvolved (n=79)	Satisfied savers (n=107)	Prone-to-switch users (n=105)	Service mavens (n=152)	F-Value	Significance (p<0.005)
Value for money	VM1	2.79	4.08	1.66	2.49	126.243	0.000
	VM2	3.23	4.25	1.70	2.78	201.393	0.000
	VM3	2.75	4.20	1.58	2.74	185.890	0.000
	VM4	3.36	4.49	1.59	3.04	248.968	0.000
Corporate image	IMG2	3.34	3.97	2.16	3.30	143.784	0.000
	IMG3	3.39	4.40	1.84	3.26	184.852	0.000
Attractiveness alternatives	ATR1	3.32	2.50	4.29	3.43	65.295	0.000
	ATR2	3.61	2.94	4.24	3.71	26.691	0.000
Search effort	SEAR1	1.91	3.62	2.69	3.62	46.796	0.000
	SEAR2	1.47	3.13	2.45	3.30	46.145	0.000
	SEAR3	1.44	3.14	2.30	3.32	59.079	0.000
Involvement	INV2	2.35	4.03	2.86	3.36	50.941	0.000
	INV3	2.17	3.43	2.79	3.29	31.944	0.000
	INV4	2.16	3.49	2.82	3.30	26.128	0.000
Satisfaction	SAT1	3.45	4.70	1.82	3.27	269.524	0.000
	SAT2	3.37	4.72	1.88	3.38	220.107	0.000
	SAT3	3.35	4.44	1.83	3.31	206.512	0.000
	SAT4	3.37	4.46	1.88	3.34	259.842	0.000
Loyalty	LOY1	3.36	4.67	1.70	3.24	277.921	0.000
	LOY2	3.42	4.71	1.63	3.22	327.466	0.000
	LOY3	3.51	4.59	1.81	3.01	295.252	0.000
Switching intention	SWIT1	2.45	1.67	4.33	3.07	143.556	0.000
	SWIT2	1.97	1.18	3.52	2.51	104.901	0.000

Then, the differences between the four segments are examined, and demographic and socioeconomic variables, as well as the type of subscription contract or the type of mobile device are compared (Table 5). Findings indicate significant differences regarding the type of mobile subscription contract, and the household average income level. However, findings do not support differences among user segments

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regarding the type of mobile device, the customers' education level, their age or gender. Therefore, it can be assumed that the segments are not distinct regarding their age structure, gender or education level, or that there are only minor differences in demographic characteristics between the segments.

Table 5. Description of four-cluster group solution.

Variables	Indicators	Cluster Means				Tuckey test	
		Pragmatic uninvolved (n=79)	Satisfied savers (n=107)	Prone-to-switch users (n=105)	Service mavens (n=152)	F-Value	Significance (p<0.005)
Subsidized/ Not subsidized mobile device	Not subsidized mobile handset	14.2%	17.8%	29.5%	15.2%	2.065	0.104
	Totally subsidized handset	39.0%	52.3%	30.5%	45.0%		
	Partially subsidized handset	42.9%	29.0%	38.1%	38.4%		
	Second-hand purchase	3.9%	0.9%	1.9%	1.4%		
Type of subscription contract	Pre-paid card	2.6%	2.8%	11.4%	9.9%	4,207	0.006
	Lock-in contract	87.1%	70.1%	50.5%	66.8%		
	Free contract	10.3%	27.1%	38.1%	23.3%		
Education level	Did not complete primary education	-	-	-	-	0.632	0.595
	Primary education	10.4%	10.2%	6.0%	10.7%		
	Secondary education	30.4%	30.5%	27.3%	17.2%		
	University studies	56.6%	57.4%	66.7%	67.5%		
	Ph.D. Doctoral studies	2.6%	1.9%	-	4.6%		
Age	Less than 20 years	8.1%	9.3%	6.5%	6.6%	0.954	0.412
	21-30 years	42.7%	50.4%	85.7%	71.5%		
	31-40 years	26.3%	26.6%	6.6%	16.0%		
	41-50 years	21.6%	10.9%	1.2%	5.9%		
	Older than 50	1.3%	2.8%	-	-		
Household average Income level (Eur/Year)	6,000-12,000	3.9%	-	-	9.3%	5.802	0.001
	12,000-18,000	12.5%	43.0%	46.6%	25.2%		
	18,000-24,000	14.2%	26.2%	25.7%	13.9%		
	24,000-30,000	29.5%	13.1%	16.2%	21.2%		
	30,000-36,000	19.1%	4.7%	2.9%	17.2%		
	36,000-42,000	6.5%	5.5%	3.8%	9.9%		
	More than 42,000	14.3%	7.5%	4.8%	3.3%		
Gender	Male	41.6%	47.7%	31.4%	45%	2.283	0.078
	Female	58.4%	52.3%	68.6%	55%		

DISCUSSION OF RESULTS

Cluster 1: “Pragmatic Uninvolved”

This cluster comprises the 17.83% of the sample (n=79), being the smallest cluster group characterized by their pragmatism and low involvement with mobile services. Further, the majority of this customer group has lock-in contracts (87.1%); thus representing the group with the highest mobile subscription duration. For this reason they are labeled as “*pragmatic uninvolved*” customers.

These customers show the lowest mean scores for involvement, meaning that they are poorly involved with the mobile communication services they have subscribed and that they are the least interested group in mobile services. One potential explanation for their low involvement is that these *pragmatic* users only use mobile services for the most elementary and traditional communication services such as calling and texting, making a simple pragmatic usage of mobile services. Likewise, they show the lowest search effort for mobile services in the marketplace, suggesting that they do not waste time comparing offers or getting informed about mobile services and operators. The reason may be that these customers assume that there are not such big differences among mobile services and operators. Additionally, this customer group shows moderately high values for value-for-money, meaning that these customers seek for low cost and monetary benefits in their relationship with mobile service providers. Similarly, they show moderately high values for corporate image, satisfaction and loyalty, suggesting that other variables rather than the service cost influences their satisfaction.

Interestingly, the type of service subscription contract is significantly different in the four segments. The “*pragmatic uninvolved*” customers is the most conservative group, since the 87.1% of them has a lock-in contract, while the “*prone-to-switch*” customers represents the segment with the highest percentage of free contracts. In addition, these customers show the highest proportion of lock-in contracts with the highest mobile subscription duration and are moderately satisfied with their mobile services. Thus, it can be stated that these customers have not switched their mobile providers because they are moderately satisfied, even though they are not strongly satisfied with the value for money offered. Accordingly, it can be assumed that these customers resemble a conservative segment, regarding their use behavior and subscription contracts with mobile services. Based on their poor service involvement and their low search effort, despite considering that there are attractive alternatives available in the marketplace, these customers could be characterized as driven by rationality and functionality. Therefore, they seem to give great importance to service pragmatic attributes, such as utility or usability.

Cluster 2: “Satisfied Savers”

This cluster represents the 24.15% of the sample (n=107), including mostly customers with a totally subsidized mobile handset (52.3%). This is the customer group that shows higher mean scores for value for money, and interestingly, they achieve the highest value for VM1 “*my company is cheap/affordable*”, indicating that this customer group seeks for affordable, cheap and low prices when contracting mobile services. Further, these customers could be considered as price-sensitive and individuals who value the economic costs of mobile services and who try to maximize the value-for-money for the services they subscribe. Likewise, this customer group exhibits the highest levels of involvement, satisfaction and loyalty towards mobile services; highlighting their highest mean score for SAT2 “*this company meets my needs perfectly*”. Thus, considering their high satisfaction and great proneness to save they are labeled

as “*satisfied savers*”. Similarly, this customer segment exhibits the highest mean values for company corporate image and a moderate level of search effort. One possible reason is that these customers waste time and effort in order to find an affordable cheap alternative service that offer benefits and a good-value for money relationship; because they perceive that a good and favorable corporate image assures an adequate service quality.

In addition, these customers show the highest mean scores of service involvement, meaning that they are strongly involved with their mobile service companies. Hence, it can be assumed that this customer segment places great emphasis on the economic value of mobile services in order to get satisfied and involved. Finally, they exhibit the highest scores for company loyalty, suggesting that they have a high price tolerance to switch to other mobile service providers.

Cluster 3: “Prone-to-Switch Users”

Customers in this cluster comprise 23.70% of the sample (n=105). This customer group is mostly composed of young users, since the 85.7% of them are between 21 and 30 years old and shows the highest percentage of free contracts (38.1%) compared to the other customer segments. Interestingly, this group shows the highest mean scores for switching intention and the availability of attractive alternatives, as well as the lowest scores for company loyalty; and in turn, they are labeled as “*prone-to-switch*” users.

It should be highlighted that this cluster exhibits the highest mean scorers for the attractiveness of other alternatives, meaning that they would be happy with other mobile service companies, and that they have the perception of the availability of other good companies in the marketplace. Maybe this is the reason why these customers also show the greatest intention to switch company. Interestingly, the 38.1% of these customers have a free subscription contract with their mobile operators, meaning that they can switch company without being penalized. One potential explanation is that these customers do not want to be locked-in in a mobile service subscription contract, due to their low loyalty and high propensity to switch service providers. Likewise, these customers seem to be prone to switch their company instantly to those mobile service providers that offer added-value or interesting services. Consequently, they could be described as a strongly disloyal customer group. May be a positive relationship could be established between these customers’ age and their poor loyalty and high switching intention, since this customer segment is mostly composed by young users.

In addition, customers in this group experience the lowest values for satisfaction, suggesting that they are not satisfied with their actual mobile service companies. Finally, these customers show the lowest mean scores for value for money, indicating that they are not especially focused on good value for money, or on cheap affordable prices; so it seems that finding a cheaper or more affordable service offering it not a reason to switch their actual service operators.

Cluster 4: “Service Mavens”

This is the largest of the four clusters and includes 34.31% of the sample (n=152), that is predominantly made up of young users (71.5%), who are 18 to 30 years old. In addition, the majority of customers in this cluster has university studies (67.5%).

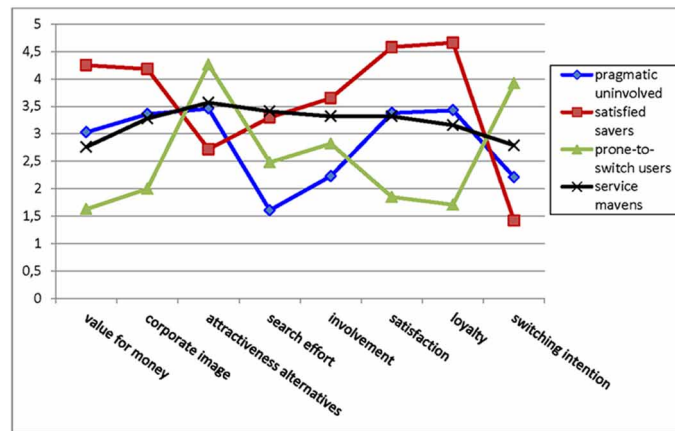
This customer group shows the highest values for the search effort before contracting the mobile service with their current operators, and for this reason they are labelled as “*service mavens*”. In the context of mobile service where users have access to a wide variety of services and several service providers,

these customers are characterized by their great search effort, indicating that they engage more heavily in information searching and service learning. That is, these customers search of great information, visit different companies and invest a great amount of time to compare different mobile service subscription offers. Accordingly, the “*service mavens*” are willing to exert great effort in searching and learning for the service with the best characteristics and value in the market. One possible explanation for their great search effort is that individuals in general terms tend to reduce the uncertainty and risk associated with their purchase and subscription decisions by collecting as much useful information as they can. For this reason, when making a purchase or service subscription decision, individuals always tend to gather as much information as possible, before the final purchase decision is made.

Considering that most of these customers are young users with university studies, it can be assumed that these customers lend particular attention to the more recent mobile advanced services and to the availability of new services and applications. Further, these customers could be greatly interested in mobile service innovations, since they actively seek information about services. Similarly, it can be assumed that this customer group is busy with catching up with the latest technological and service advances and investigating the new launches of mobile services.

Compared to other clusters, these customers score above the average in involvement, satisfaction and loyalty with mobile services. Moreover, they show a moderately high value for switching intention, meaning that they are strongly motivated to learn about mobile services, and are keen to switch to better companies and services when they find more attractive alternatives. Finally, a profile of the different customer segments is shown in Figure 2.

Figure 2. Mobile service customers’ profile



MANAGERIAL RECOMMENDATIONS

It is essential that mobile service companies tailor their services to better meet the different segments’ characteristics. In this section some management recommendations for mobile communication companies and operators are described in order to target each segment.

Cluster 1: “Pragmatic Uninvolved”

Mobile service companies targeting “*pragmatic uninvolved*” customers should put great emphasis to the fundamental functions and utilitarian aspects that users traditionally expect from a mobile service provider, such as traditional communication and media applications, rather than to the cost and monetary benefits offered to customers. In addition, mobile service companies can adopt the concept of “*one-stop-shopping*” to provide a friendly single interface to these customers, so that they acquire the desired mobile services through the simplest and most convenient experience. Likewise, an immediate and efficient service could be provided to attract and retain the “*pragmatic uninvolved*” customers. Finally, mobile service managers should use rational and functional cues in their service marketing communication strategies, given that this group is receptive to functional information.

Cluster 2: “Satisfied Savers”

In order to target the so-called “*satisfied savers*” companies need to increase the user satisfaction that for these customers is strongly related with a good value for money and monetary benefits. Therefore, mobile service companies should provide mobile services with a good monetary cost-benefit relationship, offering low monetary costs. Additionally, and considering that these customers are the most loyal to their mobile service companies, mobile companies should develop loyalty programs to reward them with some benefits for their long-term relationship with their mobile service providers. For example, mobile service companies could offer tariff plans with a rebate mechanism, whereby users receive bonuses for the calls they make or receive; thus, rewarding their loyalty. Moreover, mobile service providers are recommended to develop promotions to reduce the threshold of service tariff or service packages. Other loyalty reward actions could be offering free airtime, discounts on merchant deals, bill rebates and redeemable points. These actions could also be used to maintain the solid base of loyal customers.

Cluster 3: “Prone-to-Switch Users”

In order to create and increase mobile service user retention it is necessary to focus on subscription duration. In fact, the differences observed among customer groups highlight that “*prone-to-switch users*” have the highest proportion of free-contracts, along with the greater proportion of not subsidized mobile devices. Therefore, it is crucial for mobile service companies targeting this group to comprehend the key drivers of their loyalty and to understand their evaluation of the services provided to create and offer a differentiated superior offering. Accordingly, mobile companies should find new ways to add value to their services in order to target this customer segment.

Considering their great proneness to switch company, a great number of researches support the need to enhance service customization to achieve higher levels of customer loyalty and to reduce customer switching intention. The reason is that highly customized services create switching costs and diminish the attractiveness of other competing alternatives; that in turn increase customer loyalty. Therefore, mobile service companies should incorporate elements and features of service customization into the design of mobile service packages and service plans that then can be chosen by customers based on their usage preferences and needs.

Cluster 4: “Service Mavens”

Mobile service companies should take into consideration that this is the largest customer segment; and therefore, this customer may become a lucrative attractive segment simply because of their large size. Considering that this customer segment is potentially very appealing for mobile service companies, managers could focus their marketing efforts to improve their relationships with these customers providing value-added services. Moreover, this customer segment values technical information and for this reason, mobile companies should provide much detailed technical information to these customers. Finally, mobile companies targeting this segment should innovate and constantly create and deliver new mobile services.

Table 6. Mobile service customers’ description and managerial implications

Attributes	CLUSTER PROFILES			
	Pragmatic-uninvolved	Satisfied savers	Prone-to-switch users	Mobile service mavens
Customer characteristics	Pragmatic use Low consumer involvement with mobile services	Low switching intention to other service providers Moderately satisfied	High switching intention and low loyalty	Strongly involved with mobile services Perceive and value the service quality, characteristics and attributes
Demanded Service characteristics	Traditional communication functions (texting, voice,...)	Good value-for-money relationship Affordable service	Customized personalized services	Innovative and diversified mobile services
Managerial implications	Offer fundamental functions and traditional practical services, such as voice communication and conventional media applications Offer a simple purchasing and contracting experience	Provide value-for-money Increase monetary value through savings and service package promotions Loyalty reward programs Free airtime, discounts on merchant deals, bill rebates and redeemable points Reduction of tariffs Offer attractive price bundles	Service customization Customized mobile service packages and service plans Loyalty reward programs Offer value-added services	Provide value-added services Provide much technical information on services offered Offer innovative and diversified mobile services

Source: Own elaboration

CONCLUSION

The present study identifies different segments of mobile service customers based on the benefits sought -value for money, corporate image, attractiveness of alternatives- and behavioral outcomes, improving the understanding of mobile services use. Additionally, the customer segments are profiled based on their characteristics in terms of socioeconomic and demographic features, as well as service subscription duration and type. Four different customer types emerge from results with substantial differences that are labelled as “pragmatic uninvolved”, “satisfied savers”, “prone-to-switch” users and “service mavens”, being the “service mavens” the most attractive segment for mobile service companies since this is the largest segment and they do not seek for affordable prices. Then, these results are used to

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propose some managerial recommendations for mobile service companies in order to increase user retention and satisfaction.

One major finding is to reveal the existence of diverse customer groups to be satisfied by mobile companies; highlighting that in the market, there is room for different services that are truly differentiated and targeting different segments. Therefore, mobile service customers cannot be seen as a homogenous group, and mobile service companies should offer tailored services adapting to the different segments and their specific characteristics and needs. Similarly, the major contribution of this study is providing a clustered-based profile of mobile service customers, which may help mobile companies to better understand customers' behavior.

Finally, this study presents some limitations. In the first place, it should be noted that the identified customer segments are unlikely to remain stable over time, since the more specific the segmentation variables, the less stable the customer segments will be. For this reason, further research could repeat the mobile service user segmentation analysis over time, since mobile service users could be evolving; and in turn, the identified customer segments are unlikely to remain stable. Secondly, the data for the study come from one single market; so, research replications across other countries will establish further generalizations. Hence, future extension of the research to other markets and countries could provide interesting results on the topic. In the third place, future research could explore and conduct mobile service customer segmentation with more depth, including a greater number of variables such as customer innovativeness, mobile services' price and promotions. Finally, research on mobile services could also replicate the cluster analysis to some specific mobile services such as applications, video games or GPS services.

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Chapter 32

Continuance Usage of Mobile Banking Services Among Small and Medium Enterprises (SMEs) in Tanzania

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ABSTRACT

The study examines the intention to continue using mobile banking services among SMEs in Tanzania. The study extended the ECS-IS model by adding three variables: ease-of-use, perceived trust, and attitude to address the existing challenges in continuance usage of mobile banking services. Data was collected using a self-administered questionnaire from company's owners and managers. A total of 287 responses were used in data analysis. SEM technique was employed to evaluate the measurement and structural models. The study found that satisfaction and attitude have a direct influence on continuance usage of mobile banking among SMEs in Tanzania. Furthermore, confirmation, perceived trust, and perceived usefulness have an indirect effect on continuance usage of mobile banking services among SMEs. The study provides useful insights which could be used by mobile banking service providers to improve banking services delivered through mobile technology. Furthermore, the findings will assist scholars in understanding the antecedents which affect continuance usage of mobile banking services among SMEs.

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INTRODUCTION

Technological innovation is rapidly changing the traditional banking approach. The transition from the costly physical branch system to modern banking ranging from automated teller machines to 24/7 e-banking is definitely an achievement (Arif, Afshan, & Sharif, 2016). The advancement of information technology has certainly provided banks and users such as micro and small enterprises with significant unit cost-saving and the required level of efficiency for a competitive edge. For example, Small and Medium Enterprises (SME) owners/managers have taken the liberty to adopt mobile banking as they need low-cost accounts to take advantage of small savings and micro-credit opportunities, as well as to enhance the quality of their services and increase growth (Kones, 2014). The use of information technology has therefore placed banks closer to their customers by providing convenience and comfortable banking services (Bangens & Söderberg, 2011). With the help of the internet, the branchless banking system has revolutionized the way micro, small and medium companies pay their suppliers, receive customer deposits and settle their trades with wholesalers (Bangens & Söderberg, 2011; Ndiwalana, Morawczynski & Popov, 2010).

Mobile banking refers to a “channel whereby the consumer interacts with a bank via a mobile device, such as a mobile phone or personal digital assistant; in that sense it can be considered as a subset of electronic banking and an extension of internet banking with its own unique characteristics” (Laukkanen & Pasanen, 2008). The use of mobile banking technology can, therefore, be considered as an innovative alternative channel to traditional banking approaches such as Automated Teller Machine (ATM), internet banking and physical branch-banking (Arif et al., 2016).

In Tanzania, the use of mobile banking technology picked up since 2007 when the idea was first introduced (Masamila, 2014; Mwinyimvua, 2013). Although there are nearly 50 Banks in the country, most of them are operating in a greatly unbanked market (Masamila, 2014). According to the Bank of Tanzania BOT (2016), mobile banking transactions had reached 4,411,674 million worth of TZS 194.1 billion in 2016. The benefits attached to mobile banking such as convenience, accessibility and personalization are an indication of its positive effects on daily business transactions in the country.

Other benefits related to mobile banking usage particularly for small enterprises include improved banking facility, easy settlement of trade, and an improved small business environment due to faster transactions and better cash management (Ahad, 2014). Despite its benefits, researches show that the adoption and continuance usage of this technology-enhanced financial channel between Micro and Small Enterprises is still low in Tanzania (Chale & Mbamba, 2015). The major barriers to mobile banking continuance usage by Micro and Small-sized Enterprises include technology complexity, privacy and security aspect of the service (Arif et al., 2016; Bangens & Söderberg, 2011). Furthermore, a thorough literature review reveals no evidence for any empirical studies which have examined the antecedents for continuance usage of mobile banking among SMEs in Tanzania. Bhattacharjee (2001a) argued that the success of any technology depends on its continuance usage. This is because ineffective usage could lead to wastage of resources and effort invested to develop the technology. This means mobile service providers could not make a profit, if users discontinue from using their services. Furthermore, it is established that the cost of acquiring new customers is five times than that of retaining existing customers (Reichheld & Schefter 2000). Therefore, unless SMEs continue using mobile services, mobile service providers could not achieve success. Due to these reasons, there is a need to examine continuance usage of mobile banking service in providing SMEs’ services in Tanzania. In Tanzanian context, SMEs are categorized as micro enterprises with capital up to US dollars 2,174, small enterprises with capital

from US dollars 2,174 to US dollars 86,957, medium enterprises with capital from US dollars 86,957 to US dollars 347,826 and large enterprises with capital from US dollars 347,826 and above (URT, 2003).

SMEs with the initial experience of using mobile banking services are in a good position to share their experience on continued usage of the mobile banking services as compared to those which have no prior experience. Therefore, this study aims to examine the factors that induce existing SMEs which are using mobile banking technology to continue using mobile banking services. ECM-ISC model was extended by using perceived ease-of-use; perceived trust and attitude to develop a research framework for examining continuance usage of mobile banking among SMEs in Tanzania. Specifically, this study examines the significant effects of ECM-ISC's variables in continuance usage of mobile banking among SMEs. Furthermore, the study examines the significant effects of ease-of-use, perceived trust and attribute on continuance usage of mobile banking among SMEs. The findings of this study could be useful to Tanzanian banks and other financial institutions in developing their strategies for promoting mobile banking usage especially for micro, small and medium enterprises. The research framework developed in this study could offer alternative strategies for continuance usage of mobile banking service among SME's in Tanzania.

LITERATURE REVIEW

Theoretical Background

Governments are increasingly motivating SMEs to use ICT in their businesses since they play major roles in national economies (Baporikar, 2019; Ongori & Migiro, 2010). In Tanzania, several institutional infrastructures have been put in place to enable smooth utilization of ICT among SMEs. Examples include, the establishment of centers for easy access of information pertinent to the development of SMEs, the National SMEs policy which provides among other things guidance on facilitation and adoption of technologies (including ICT) (URT, 2003), and numerous training workshops organized by the Ministry of Industry, Trade and Investment to empower SMEs on ICT use in business. Several studies have indicated how ICT could help SMEs to harness the benefits of ICT in the following categories: to achieve a competitive advantage, support business processes and decision making. For example, Baporikar (2016), Kalkan, Erdil and Çetinkaya (2011), Mandal (2016), Melville, Kraemer and Gurbaxani (2019) investigated general use of ICT in shaping business competitiveness and Ge'rguri-Rashiti, Abazi-Alili and Dika (2013), López-nicolás and Soto-acosta (2010) studied the role of ICT in supporting business processes and decision making. However, attaining the benefits of ICT entirely depends on SME's willingness to adopt and preserve ICT presence in their daily activities. Banking and financial services are among critical business activities in any SME which drives SMEs to use ICT (Baporikar, 2013). One useful way of managing finance in any business can be achieved through mobile banking (Beneke, 2011).

Review of the literature suggests that SMEs are likely to apply theories as a platform for determining factors which motivates the adoption and continuance usage of mobile banking services. Different theories have been used to examine the adoption of mobile banking technology. The dominant theories such as Theory of Reasoned Action (TRA), Theory of Planned Behavior (TPB), Technology Acceptance Model (TAM), Unified Theory of Acceptance and Use of Technology (UTAUT) and Innovation Diffusion Theory (IDT) are used in examining the intention and the actual usage behaviour which are considered as pre-conditions for initial acceptance of the technology (Bhattacharjee, 2001a; Malik, Suresh, &

Sharma, 2017). Nevertheless, previous studies have shown that for sustainable and successful utilization of information systems, post-conditions for continuance usage also should be examined (Bhattacharjee, 2001a; Hsieh & Wang, 2007). This is because infrequent, inappropriate and ineffective long-term usage of IS contributed to organizational failure (Bhattacharjee, 2001a). Various studies have examined the continuance usage of technology by using behaviour adoptive theories used in evaluating the adoption of information system in initial acceptance stage (Hong, Thong, & Tam, 2006; Lankton, McKnight, & Thatcher, 2012). However, using adoptive theories have been criticized because their constructs tend to produce insignificant relationships over a long period of time due to experience gained by using the technology (Venkatesh, Speier, & Morris, 2002; Yin, Cheng, & Zhu, 2011). Therefore, Information Systems (IS) literature suggests using theories dedicated to examining IS continuance behaviour (Yin et al., 2011).

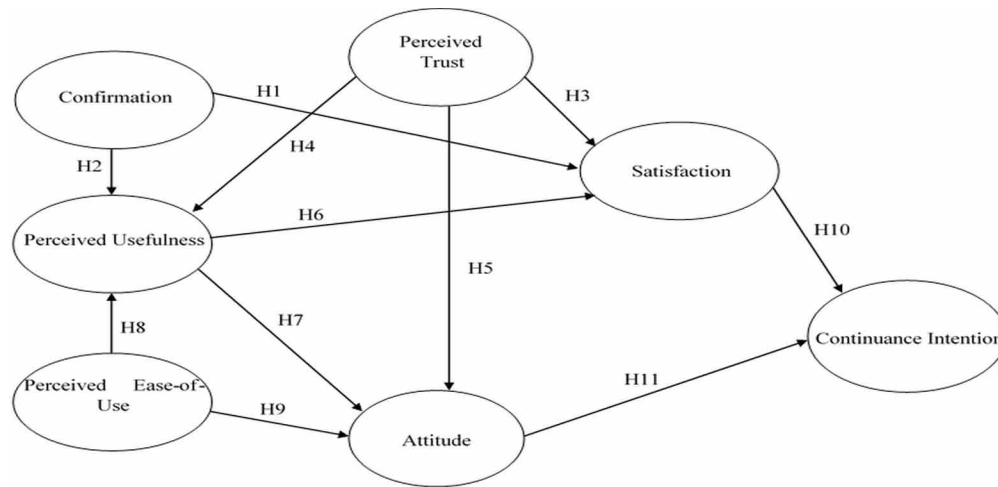
Expectation-Confirmation Model of Information Systems Continuance (ECM-ISC) is one of the theories developed specifically to examine continuance usage of Information System or technology (Bhattacharjee, 2001b; Yaojun & Yongliang, 2015). ECM-ISC theorizes that continuance intention is determined by satisfaction, while satisfaction is determined by two factors which are confirmation and perceived usefulness (Bhattacharjee, 2001a). The theory has been used to study different technologies in examining continuance intention and produced a significant relationship between the variables (Bhattacharjee, 2001a; Yin et al., 2011). Based on the above arguments, this study adapts ECM-ISC to examine the continuance usage of mobile banking among SMEs in Tanzania.

Research Model and Hypotheses

ECM-ISC model was adapted to develop a conceptual model of this study. This is because the theory was specifically developed to examine users' continuance usage behaviour in information systems (IS) (Bhattacharjee, 2001a). Furthermore, in examining the continuance usage behaviour, satisfaction and confirmation are among the key very factors. Therefore, using ECM-ISC model will provide useful information on satisfaction and confirmation factors. The theory was further extended by adding three variables which are perceived trust, perceived ease-of-use and attitude. This is because, most of the studies have highlighted that majority of the mobile banking users in Tanzania are more concerned with trust issues and complexity of mobile banking applications (Masamila, 2014; Zafiroopoulos, Karavasilis, & Vrana, 2012). This implies that a low level of trust and complexity of mobile banking application also tends to affect users' attitude. This means if mobile service's users have low trust on service providers while perceiving the services to be very complex to use, their attitude over the mobile services could be affected and they may stop using the services. Despite this fact, to the best knowledge of the authors, no previous studies have conducted an empirical study to examine the impact of the three variables on continuance usage of mobile banking among SMEs in Tanzania. Therefore, this is a research gap this study intends to fill by examining the influence of the added variables on continuance usage of Mobile banking among SMSs (Figure 1).

The user's pre-adoption expectations and actual performance of the information system defines a user's satisfaction regarding the adopted information system (Yuan, Liu, Yao, & Liu, 2016). Previous studies have shown that if the user is satisfied with the performance of the adopted system, then his/her pre-adoption expectations are relative with the performance of the system, therefore, user's expectations are confirmed or else are not confirmed (Yuan et al., 2016; Yaojun & Yongliang, 2015). Several studies have shown that confirmation has a positive influence on satisfaction (Yuan et al., 2016). In this study, if

Figure 1. Research model



SME confirms their pre-adoption expectations, then they will be satisfied with the performance of mobile banking and therefore they will continue using mobile banking. Hence, this study hypothesizes that:

- H1:** Confirmation is positively influencing the satisfaction of mobile banking services among SMEs.
- H2:** Confirmation is positively influencing the perceived usefulness of mobile banking among SMEs.

Trust is considered as one of the most important factors in the success of mobile banking because transactions are conducted online without human interventions (Bataineh, Al-Abdallah, & Alkharabsheh, 2015; Zhou & Liu, 2014). Trust allows the banks’ customers to willingly become vulnerable after using mobile banking systems and therefore the systems have to be reliable and trustworthy. Most of the mobile banking users are satisfied with technology if they have high trust in the security, privacy and convenience (Bataineh et al., 2015). Several previous studies have shown that trust has a positive influence on satisfaction (Dlodlo, 2014). Similarly, SME’s mobile banking users will be satisfied if they perceive mobile banking to be trusted. Hence, this study hypothesizes that:

- H3:** Perceived trust is positively influencing the satisfaction of using mobile banking services among SMEs.
- H4:** Perceived trust is positively influencing the perceived usefulness of mobile banking among SMEs.
- H5:** Perceived trust is positively influencing SME’s attitude to continue using mobile banking.

Perceived usefulness is defined as the extent to which the user perceives the technology to enhance his/her job performance (Davis, 1989). If the adopted information system is perceived to assist the user to accomplish his/her job in an efficient and effective way, then, the satisfaction of the user tends to increase (Yuan et al., 2016; Zhou & Liu, 2014). Furthermore, if mobile service providers will guarantee availability and timely access to information to services consumers, they will increase satisfaction and maintain a good relationship with their customers. This will prevent customers from discontinuing the services. On the other hand, if service consumers are likely to stop using the services or switch to

alternative service providers if they do not find the expected utility from mobile service providers. Several studies have shown that perceived usefulness has a positive influence on satisfaction and continuance intention to use technology (Bhattacharjee, 2001a; Yuan et al., 2016). This study hypothesizes that:

H6: Perceived usefulness is positively influencing the satisfaction of mobile banking services among SMEs.

H7: Perceived usefulness is positively influencing continuance usage intention of mobile banking services among SMEs.

Perceived ease-of-use is defined as the extent to which a user perceives that using a particular technology/system will be free from the effort (Davis, 1989). Service consumers are likely to continue using services if they found it to be easy to use. On the other hand, service consumers are likely to stop using services if they found difficultness on using the services. Findings from previous researchers have shown that perceived ease-of-use has a positive and significant influence on perceived usefulness and continuance usage intention (Yuan et al., 2016; Zhou & Liu, 2014). Similarly, a mobile banking system which is easy to use could be perceived as usefulness and could increase the likelihood of intention to continue using it in different SME activities. Based on this, this study hypothesizes that:

H8: Perceived ease-of-use is positively influencing the perceived usefulness of mobile banking services among SMEs.

H9: Perceived ease-of-use is positively influencing continuance usage intention of mobile banking services among SMEs.

Satisfaction is defined as the emotion-based responses shown by the user after the initial adoption of an information system or information technology (Malik et al., 2017; Yuan et al., 2016). Furthermore, it is considered as a pleasure expressed by the user after using the information system or information technology. If the user is satisfied with the value received from using the information system/technology then the likelihood to continue using the information system or information technology tends to be very high (Yuan et al., 2016). Past studies have shown that satisfaction has a positive and significant influence on continuance usage of mobile banking (Dlodlo, 2014; Yuan et al., 2016). Similarly, if SMEs are satisfied with the value provided by using mobile banking technology, their likelihood to continue using the mobile banking services in their activities will be very high. Therefore, this study hypothesizes that:

H10: Satisfaction is positively influencing the continuance usage intention of mobile banking services among SMEs.

Attitude is defined as the degree to which an individual is favourably or unfavourably toward a given technology. Different studies have shown that positive attitude which is built based on past experiences and available information has a positive influence on the adoption of technology (Fishbein & Ajzen 1975; Ma, Gam, & Banning, 2017). In the case of continued usage of technology, studies have shown that technology users who hold a positive attitude after adoption keep on using the technology (Praveena & Thomas, 2014). Similarly to this study, SME's with an attitude that using mobile banking could enhance their activities have a high likelihood of keep on using mobile banking services. Therefore, this study hypothesizes that:

H11: SME's attitude is positively influencing continuance usage intention of mobile banking services among SMEs.

METHOD

Measurement Items and Questionnaire

The theoretical research model employed in this study composed of seven (7) constructs. Each construct was measured using multiple measurement items. Measurement items were adopted from past studies to ensure content validity (Straub et al. 2004), carefully selected and modified to reflect the context of this study (Kim & Oh, 2011). All measurement items corresponding to each construct in this study were measured using a five-point Likert scale anchored from strongly disagree (1) to strongly agree (5). A total of thirty (30) measurement items for measuring constructs of the study and five (5) questions for gathering demographic information of respondents were used. The measurement items for confirmation were drawn from Bennett, Perrewé, Kane, Borgatti and Performance (2001) and Bhattacharjee (2001b), perceived trust from Lee and Benbasat (2004) and Shin (2010), perceived usefulness and perceived ease-of-use from Venkatesh and Davis (2000), attitude from Ajzen (1991); satisfaction from Bhattacharjee (2001b), Premkumar and Bhattacharjee (2008). Additionally, measurement items for continuance intention were drawn from Bhattacharjee (2001); Liao, Palvia and Chen (2009) and Wang, Xu, and Chan(2015). The questionnaire was developed using English language and translated to the Swahili language. This is because Swahili is the native language in Tanzania. Linguistic experts from credible Institution were used for translation. The translated questionnaire was piloted to check if it is clearly understood by respondents. Further fine-tuning was done based on pilot study suggestions.

Participants and Sampling Procedures

Data were collected from SMEs located in Dar es Salaam city, Tanzania. Dar es Salaam is the business city of Tanzania with relative higher number SMEs compared with other regions (NBS, 2016). Therefore, the selection of SMEs which are based in Dar es Salaam offers a fair representation of other SMEs located in other regions. 293 questionnaires were collected, of which six (6) questionnaires were dropped during data cleaning. 287 questionnaires were considered to be valid and were used for subsequent data analysis. Data collection took three (3) months, from January to March 2019.

The study examined self-reported behaviours of SMEs owners on their intention to continue using mobile banking services. In order to increase the external validity of the data collected, data were collected using the questionnaire from respondents (SMEs) who are currently using mobile banking services. Purposive sampling technique was employed to identify only SME owners and managers who are currently using mobile banking and willing to complete the questionnaire (Etikan, Musa, & Alkassim, 2016). The questionnaires were physically administered to only respondents with required characteristics and willing to complete the questionnaire. In addition, the authors included questions regarding a number of employees and capital invested in the demographic part that reflect different categories of SMEs in the Tanzanian context(URT, 2003). The purpose of the study was clearly stated in the questionnaire. Furthermore, the respondents were assured of anonymity and confidentiality of data collected.

DATA ANALYSIS

Descriptive Analysis

Table 1 shows that most of the SME's (41.9%) are in the "other" SME category. Furthermore, findings show that most of the SMEs have up to 49 employees and with a capital investment of up to 200 million. SMEs with capital US dollar 2,174 – US dollar 86,957 and 2,174 or less were largely represented in the sample. This sample is comparable to findings by the Tanzania Ministry of Industry, Trade and Investment, which indicated that the SME sector is dominated by the above two groups (URT, 2012). In addition, the findings show that most of the organizations (67.5%) have used mobile banking service for more than three years and most of them (71.3%) are using mobile banking more than six (6) times a week for business activities.

Table 1. Descriptive information

	Category	% of Respondents
SME Category	Agricultural	4.2
	Trade	26.3
	Tourism	6.2
	Finance	21.5
	Others	41.9
No. of Employee	1-4	33.9
	5-49	47.1
	50-99	12.8
	100 and above	6.2
Capital Investment	Up to US \$ 2,174	36.3
	US \$ 2,174 – US \$ 86,957	43.3
	US \$ 86,957 – US \$ 347,826	15.6
	US \$ 347,826 and Above	4.8
Experience in Using Mobile banking	Less than a year	4.8
	1-3 Years	27.7
	Above 3 Years	67.5
Frequency in Using Mobile Banking	1-3 times	14.5
	4-6 times	14.2
	7-9 times	20.1
	Above 10	51.2

Note: Exchange rate: Bank of Tanzania – 2,300TZS = 1 US dollar

Data Normality Assessment

The study employed maximum likelihood estimation (MLE), a robust procedure for studies using SEM (Schumacker & Lomax, 2015). This procedure data should meet conditions for multivariate normality. An assessment of the multivariate normality was based on kurtosis values because kurtosis is more relevant to SEM since it affects the estimation of variance and covariance (DeCarlo, 1997). The study found that multivariate kurtosis value was 101.762, which is well above the accepted threshold of less than 5 for the normally distributed data (Byrne, 2009). Nevertheless, MLE is robust to multivariate normality violations given that the sample size is greater than 200 and the impact of violations diminishes as the sample becomes large (Hair, Black, Babin, & Anderson, 2010; Tabachnick & Fidell, 2007). This study used a sample size of 287 which is greater than 200, therefore the effects of multivariate non-normality would not affect the findings of the study.

Assessment of Quality of Measurement Model

The assessment of the quality of measurement items and the structural model was done using covariance-based structural equation modelling (CB-SEM) technique. The covariance-based approach is widely accepted data analysis technique for testing and confirming theoretical perspectives in IS research similar to this study (Joe Hair, Ringle, & Sarstedt, 2011). Given the facts that, the study aims to confirm the hypothesized relationships, CB-SEM was found to be a suitable technique for achieving the specified objectives. The software used was SPSS AMOS version 24.

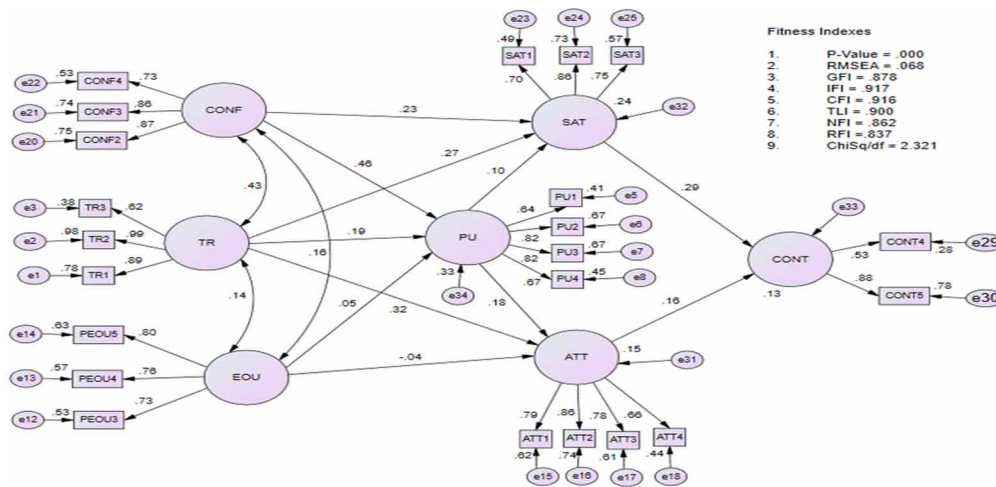
The quality of the measurement model was evaluated through reliability, construct validity analysis and model fit assessment. Analysis of the reliability of measurement items was accomplished by estimating the composite reliability scores. Composite reliability scores were above 0.7 indicating that the measurement items used in the study were reliable (Fornell & Bookstein, 1982). Regarding convergent validity, Table 2 shows that AVE values are above 0.5 and the composite reliability values were above 0.7. Also, Figure 2 shows that the factor loadings for each construct are above 0.5 suggesting that the threshold level for convergent validity has been achieved (Bagozzi & Yi 1988). Discriminant validity was assessed based on the recommendation of Fornell and Larcker(1981) and Parolia, Goodman, Li, and Jiang, (2007). The square root of the average variance extracted (AVE) of each construct should be

Table 2. Constructs AVE and CR

	CR	AVE	CONF	TR	PU	EOU	CONT	ATT	SAT
CONF	0.861	0.674	0.821						
TR	0.880	0.718	0.430	0.847					
PU	0.828	0.549	0.550	0.394	0.741				
EOU	0.805	0.579	0.154	0.181	0.158	0.761			
CONT	0.661	0.500	0.505	0.315	0.394	0.136	0.707		
ATT	0.859	0.605	0.099	0.365	0.258	0.040	0.287	0.778	
SAT	0.817	0.599	0.390	0.407	0.316	0.106	0.339	0.472	0.774

Legend: CONF: Confirmation; PU: Usefulness; CONT: Continuance ; SAT: Satisfaction; TR: Trust; EOU: Ease of Use; ATT: Attitude; CR: Composite reliability; AVE: Average Value Extracted

Figure 2. Structural model assessment



higher than an inter-constructs correlation coefficient. Results indicate that the AVE of each construct was higher than inter-correlation coefficient indicating that discriminant validity has been achieved.

The model fit assessment was evaluated by estimating model indices. This study has employed five most commonly used model fit indices in IS research: Relative Chi-Square (χ^2), Root Mean Square Error of Approximation (RMSEA), Incremental Fit Index (IFI), Confirmatory Fit Index (CFI) and Tucker-Lewis Index (TLI). As reported in Table 3, all model fit indices were well above their acceptable threshold values, suggesting a good fit of the measurement model. Based on the above statistical analyses, the measurement model used in this study was of acceptable quality.

Table 3. Threshold values for the measurement model

Fit Indices	Measurement Model Fit Indices	Acceptable Values	Source of Acceptable Values
χ^2/df	2.455	< 3	(Bentler & Bonett, 1980)
RMSEA	0.071	≤ 0.08	(Byrne, 2009)
IFI	0.920	≥ 0.90	(Hu & Bentler, 1999)
TLI	0.901	≥ 0.90	(Byrne, 2009)
CFI	0.919	≥ 0.90	(Bentler, 1990; Hartwick & Barki, 1994)

Assessment of the Structural Model

The quality of the structural model was assessed using model fit indices reported in Table 3. All model fit indices exceeded the acceptable threshold values as shown in Table 4. Results of the structural model assessment suggest that the structural model is acceptable for data analysis.

Table 4. Model fit indices

Fit Indices	Structural Model Fit Indices	Acceptable Values	Source of Acceptable Values
χ^2/df	2.321	< 3	(Bentler & Bonett, 1980)
RMSEA	0.068	≤ 0.08	(Byrne, 2009)
IFI	0.917	≥ 0.90	(Hu & Bentler, 1999)
TLI	0.900	≥ 0.90	(Byrne, 2009)
CFI	0.916	≥ 0.90	(Bentler, 1990; Hartwick & Barki, 1994)

FINDINGS AND DISCUSSIONS

After assessing the quality of the measurement items, the path analysis was conducted to check the statistical significance of its structural loads. Paths analysis of the structural model indicates that eight (8) hypothetical relationships out of eleven (11) as specified in the research model were supported. Specifically, confirmation of expectations of mobile banking services users have positive and significant effects on satisfaction ($\beta = 0.201$, $p = 0.005$) and perceived usefulness towards mobile banking services ($\beta = 0.35$, $p = 0.000$) respectively. Perceived trust on mobile banking services has positive significant effects on the attitude of mobile banking users ($\beta = 0.204$, $p = 0.000$) and perceived usefulness ($\beta = 0.134$, $p = 0.004$) and satisfaction of mobile banking services ($\beta = 0.218$, $p = 0.000$), respectively. Also, perceived usefulness of the mobile banking services have positive and significant effects on the attitude of mobile banking users ($\beta = 0.136$, $p = 0.006$), and both the attitude of users ($\beta = 0.228$, $p = 0.02$) and satisfaction ($\beta = 0.332$, $p = 0.000$) on mobile banking services have positive and significant effects on intention to continue using mobile banking services. On the contrary, the hypothetical relationships between perceived ease of use and perceived usefulness, perceived ease of use and attitude, perceived usefulness and satisfaction were not found to be significant. The results of the structural model are reported in Table 5 and Figure 2. Among eight hypothetical relationships, satisfaction and continuance intention

Table 5. Hypotheses testing findings

Hypotheses				Estimate	Standard Error	t-Values	p Values
H1	CONF	→	SAT	0.201	0.072	2.814	0.005
H2	CONF	→	PU	0.35	0.059	5.977	***
H3	TR	→	SAT	0.218	0.056	3.879	***
H4	TR	→	PU	0.134	0.046	2.895	0.004
H5	TR	→	ATT	0.204	0.044	4.676	***
H6	PU	→	SAT	0.112	0.092	1.22	0.222
H7	PU	→	ATT	0.136	0.05	2.734	0.006
H8	EOU	→	PU	0.05	0.06	0.826	0.409
H9	EOU	→	ATT	-0.033	0.057	-0.583	0.56
H10	SAT	→	CONT	0.332	0.082	4.028	***
H11	ATT	→	CONT	0.228	0.098	2.32	0.02

to use mobile banking services among SMEs have the strongest relationship followed by confirmation and perceived usefulness and perceived trust and satisfaction.

Confirmation of expectations and perceived trust of mobile banking services were the key predictors of satisfaction. This finding suggests that satisfaction is the function of both perceived trust and confirmation of expectations such that when SMEs perceived trust increases and expectations after using mobile banking services are confirmed their satisfaction level towards the mobile banking services also increases. A similar finding is also reported in studies conducted by Zhan, and Kim (2015); Alraimi, Zo, and Ciganek (2015); Chou, Lin, Lin, and Farn (2017); Vedadi and Warkentin (2016), respectively. Apart from influencing satisfaction towards mobile banking services, confirmation also plays a key role in cementing SME's perception that mobile banking services are useful to them. Specifically, this finding indicates that when an individual's expectations of the services have been confirmed, they drive them to believe that the services are useful and could boost their performance. Chang, Wong and Maruthappa (2015) and Hsu and Lin (2015) also found similar findings.

The influence of perceived trust is also reflected in its relationship with perceived usefulness and attitude of SMEs towards mobile banking services. This finding leads to the belief that perceived trust enhances attitude and perceptions of the usefulness of mobile banking services among SMEs. This finding corroborates previous studies such as Al-Debei, Akroush and Ashouri (2015); Mou, Shin and Cohen (2017).

In this study, it was found that perceived usefulness had an influence on the attitude of SMEs towards mobile banking services. The attitude of SMEs in mobile banking services is likely to increase if the benefits (usefulness) of mobile banking services on the overall performance of SMEs are well substantiated to the users. This finding is consistent with Chang, Hung, Cheng, and Wu (2015), Chuah et al. (2016). Contrary to the technology acceptance model (TAM), the relationship between perceived ease of use on both attitude and perceived usefulness was not confirmed. Nevertheless, the finding is consistent with Chuah et al. (2016). The finding indicates SMEs are not interested in how ease to use the mobile banking services are in order for them to increase their perceptions of benefits they offer and attitude towards them. Furthermore, the study found that both satisfaction and attitude towards banking services have an influence on the continuance intention of SMEs to keep on using mobile services. These findings are congruent with findings from studies conducted by Raza, Umer, and Shah (2017), and Vedadi and Warkentin (2016). Since satisfaction and attitude play an important part for both adoption and continuance to use mobile banking services, SMEs with a higher level of attitude and satisfaction towards mobile banking services are likely to continue using mobile banking services.

CONTRIBUTIONS AND IMPLICATIONS

This study contributes to the growing body of knowledge about IS continuance behaviour. Firstly, by integrating the three new constructs relevant for the prediction of continuance usage behaviours to expectation-confirmation theory. These new constructs are perceived trust, attitude and perceived ease-of-use. The interplay between the constructs of 1) perceived trusts, user's satisfaction and attitude towards the service 2) perceived ease-of-use, perceived usefulness and attitude demonstrated in this study suggest the massive influence of perceived trust construct within the expectation-confirmation theory and in IS continuance behaviours in general. We have not yet come across a study which has extended and considers these relationships in such a way. Although the interplay between these constructs contributes

indirectly to continuance behaviour, they are an integral part of the formation of continuance behaviour. This study demonstrated that perceived trust has a positive influence on satisfaction, perceived usefulness and attitude.

Banks should bear in mind the importance of trust in motivating SMEs to continue using mobile banking services. Several mechanisms can be used to ensure trust. Customer charter and ICT policy should state transparently the level of guarantee they offer for data protection and privacy of financial-related information. Additionally, banks should state clearly in their policy documents procedures to undergo in case of financial fraud and make efforts to ensure customer's money in banks account are insured. If the banks provide insurance, this should be well communicated to customers to raise customers trust that their money will not get lost as a result of online fraud. The presence of customer charter and insurance of security of customer data and finance is an industry recommended practice for improving customer trust as indicated in several previous studies such as Davinson and Sillence (2014) and Torres (2006). Appropriate strategies for cultivating SME's perceptions of trust will eventually increase satisfaction level, perceived usefulness and attitude towards continuance usage of mobile banking services. Furthermore, high levels of perceived usefulness increase the attitude of SMEs towards continuance usage intentions on mobile banking services. When SMEs are well aware of the benefits of using mobile banking services their attitude towards continuance usage intention is heightened. Promotional and awareness campaigns on mobile banking services should focus on encouraging SMEs to position mobile banking services as a strategic tool for finance management, by taking its advantages on board in their daily operations (Tiwari, Buse, & Herstatt, 2006).

Confirmation of expectations motivates SMEs satisfaction and perceived usefulness of the mobile banking services. To promote confirmation of expectations, the expectations of the users regarding mobile banking services should be well communicated in form of bank's customer or charter or policy documents to SMEs and banks should strive to meet those expectations to increase both satisfaction and perceived usefulness towards mobile banking services. Applying the discussed strategies for heightening levels of user's satisfaction and attitude towards mobile banking services will eventually motivate the intention of SMEs to continue using mobile banking services.

LIMITATIONS, FUTURE RESEARCH AND CONCLUSION

This study has several limitations worth to be listed which could be used as a base for improvement in future studies and during applying its findings in real-world settings. First, this study employed cross-sectional data; in which data was collected at one time thus it was not possible to use these findings as a base for assessing future continuance usage of mobile banking services among SMEs. Assessment of future trends is imperative for service provision planning. Future studies may apply a similar model proposed in this study to test longitudinal data with the intention of observing mobile banking services continuance usage among SMEs. Secondly, data were collected from SMEs residing in Dar es Salaam City only which represent a portion of SMEs in Tanzania. Even if Dar es Salaam has a large number of SMEs as compared to other regions, further studies are needed to evaluate the proposed research model using data collected from a SMEs residing from other regions in order to obtain a more generalized view of SMEs' perceptions on mobile banking services usage continuance.

In brief, this study extended the expectation-confirmation theory to investigate the intention of SMEs to continue using mobile banking services. Findings indicate that confirmation of expectations has a

positive influence on both satisfaction and perceived usefulness towards mobile banking services among SMEs. Perceptions of trust have significant positive effects on the attitude of mobile banking among SMEs, perceived usefulness and satisfaction of mobile banking services. Also, perceived usefulness of the mobile banking services has positive and significant effects on the attitude of mobile banking users, while the attitude of users and satisfaction on mobile banking services have positive and significant effects on intention to continue using mobile banking services among SMEs. We posit that banks should consider not only traditional factors incorporated in ECT for continuance usage intention of mobile banking services but also perceived trust and attitude of users.

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Chapter 33

Financial Literacy for Financial Inclusion Using Mobile Technology in India

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ABSTRACT

According to the RBI governor, technology-enabled financial information will spread financial literacy in an efficient and secure manner. India needs inclusive growth to pull millions out of poverty and mobile phone penetration can be a good opportunity. Consumers are exposed to a plethora of financial products but the knowledge is either not there or limited to make judicious choices. The successful implementation of financial literacy services would benefit rural people but it is a challenge to all stakeholders today. One-hundred twenty-five people all over India were selected for a survey and results point that rural poor accept mobile technology for banking related information but do not want to adopt the technology. There are various challenges for financial literacy in India discussed in the chapter. Also, opportunities are many for digital literacy and can be achieved if the challenges are overcome. All the stakeholders should put in concerted efforts at all levels to achieve financial inclusion through mobile technology disruption.

BACKGROUND

KMPG (KPMG, 2015) said that the 'Digital India' initiative will improve financial inclusion due to technological disruptions. Also people find mobile technology user friendly which has resulted in rising data traffic in the country. The initiative by the present government focuses on digital empowerment and it will positively drive financial literacy.

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Microfinance and Mobile phones should join the technology bandwagon to change the face of financial services in India. Developed economies (G20 nations) recognize financial inclusion as a key driver for achieving financial stability. Technological innovations can act as the middlemen between potentially unbanked mobile phone owners. Financial education or literacy is important to deal with the imbalance between adaptability of customers to the technology and using the device for banking related work. Mobile apps tailored for financial education or literacy should be customer specific so that they helping to understand how financial instruments can address their daily financial concerns and provide advice in such manners. The chapter tries to address financial education problem in this evolving landscape and how customers are adopting mobile technology to solve banking related matters. A few terms used in the chapter are financial literacy, mobile technology, stakeholders etc are discussed.

Literacy rate among females in India is low according to a study in IBEF . According to a paper by the New York-based International Commission on Financing Global Education Opportunity nearly 48 percent of the girls in rural India are literate. India is the second-largest telecommunication market and has the third highest number of internet users in the world according to IBEF. The internet connectivity as per the new digital India program aims to digitally empower citizens in remote areas. As part of this plan, the government wants to make mobile connectivity available in more than 40,000 villages by 2018.

India is currently the world's second-largest telecommunications market and has registered strong growth in the past decade and half. The Indian mobile economy is growing rapidly and will contribute substantially to India's Gross Domestic Product (GDP), according to report prepared by GSM Association (GSMA) in collaboration with the Boston Consulting Group (BCG) (Shubhashis, 2009). By the year 1980s people has basic telephone service in India where it was only owned by the top 0.001% of the population. But now after nearly 45 years this luxury has passed down to maximum population due to positive reforms, growth in infrastructure and technology disruption. Now further the growth is happening more rapidly with so many players the market is booming with advanced technology, great mobile devices and affordable services.

The liberal policies of the Government are the key drivers for the growth in mobile and internet users. The policies focus on availability of telecom services at affordable prices to the consumers.

Most of the mobile phone designs are targeted to attract rural consumers and Nokia was the forerunner in early 2000 – 2004. With that the mobile services / apps also started to develop and technology started to disrupt the face of handheld device and the services provided.

In terms of revenue, mobile services market revenue in India according to telecom sector report will be nearly 37 billion US dollars in 2017 according to research firm IDC (VISA, 2016) and may cross 100 billion US dollars by 2020. The Indian market is flooded with variety of mobile devices and as per Ericsson Mobility Report India more consumers are adopting smartphones which will increase internet traffic. More than 100 million devices were sold in 2016 with GSMA technology. With the coming up of 4G at affordable rates the number is sure to rise. Some of the major developments related to the telecom industry boom are:

- Merger of financial services giants like hutch – Vodafone, Airtel and Telenor etc.
- Setting up of manufacturing units like Apple in Bengaluru etc, China in UP for Vivo/ Oppo.
- FDI into telecom has also opened up the market and caused this infrastructure change as well as improved effectiveness and affordability for the rural people.

Financial Literacy for Financial Inclusion Using Mobile Technology in India

This has all been possible due to the effective Government Initiatives like reforms, investments in infrastructure building, new apps to connect with people, new models for delivery of services, payment mechanism is relaxed, Unified licensing, Public-Private Partnership (PPP) model. Reserve Bank of India in Jan 2006 allowed banks to employ two categories of intermediaries - Business Correspondents (BCs) and Business Facilitators (BFs) to expand their outreach by carrying out basic transactions on behalf of the bank as agents, interacting and advising people.

As per report by Microsoft, India will be the hottest destination for mobile users, suppliers by 2025 due to the above mentioned reforms similar to the computer revolution. The government also plans to promote 4G technology, Internet of Things (IoT), machine-to-machine communications as well as its Smart Cities initiative which will boost the sector further.

India is a cash-based economy with a large population which is unbanked i.e. they do not have active bank accounts. Secondly literacy among the population is an issue as most of the rural population is illiterate. For such a population doing banking using mobile technology is a challenge. As discussed earlier the growing population of mobile users should adopt this technology for banking for effectiveness and cost. Universal Payment Interface (UPI) provides secure mobile transactions and due to Aadhaar card mandate more people are likely to come under banking framework. 4G will accelerate this rate of penetration but the financial literacy also needs to penetrate at the same level. But this has opened up a plethora of opportunities for the financial services industry for delivery at low cost. Following are the 6 important pointers for financial inclusion (Express, 2012)

INTRODUCTION

The Reserve Bank of India defines financial inclusion as providing access at an affordable cost to the poorest of the poor. This access to banking services can unfold opportunities for financial services to a large section of unbanked population in India. If these financial services are delivered through digital platforms especially in rural/remote regions at a low cost, it will increase access at high quality and affordable rates as it will reduce transaction costs. Thus mobile technology has a major significance in providing financial services to areas where banks or banking correspondents are not able to reach or provide personal service.

India is a land of vibrant diversity where 18% of the total population on earth sustains on nearly 3% of the total land on the globe. The democratic republic gained independence in 1947 from colonial stagnation and since then is motivated to remove economic backwardness. Economic reforms were brought in around 1991 which have helped to make it an open economy. The reforms have also led India to showcase the vast potential it has. These reforms have had a far-reaching impact and have helped India unleash its enormous growth potential and also to understand its best potential is the growing human resource.

Demonetization has been our biggest teacher and people have realized that the dependency on cash needs to be decreased as digital based financial services become more common. Banks must now spread the costs or investments in technology and adapt the utilisation of existing technology in serving the population. All government and regulatory transactions are also becoming digital which further increases the need and active participation of public to become digitally financial inclusive.

Several macroeconomic factors also indicate that a sustainable digital ecosystem is getting ready on the fact that Indian consumers prefer (or are moving towards) digital technologies. The 'Digital India' initiative, together with a payments infrastructure, is laying the foundation for a digital economy with

increasing willingness of people to use the internet. It is also based upon facts that government has planned to provide Wi-Fi services in cities with a population of more than one million, broadband internet access to 250,000 village clusters by 2019, providing digital lockers to all citizens etc(According to a recent speech by our PM Mr. Narendra Modi). Linking of one number for all ‘Aadhar’ programme is the biggest disruptor in financial inclusion delivery as it is based on biometrics technology and every financial transaction is now done using ‘Aadhar’ authentication.

The paper uses Technology Acceptance Mode (TAM) and inter mixes the concepts to measure the interrelation between the identified dependent factors for successful diffusion of mobile banking (Behl, 2016). The fitness of measurement model was also judged to confirm if the model is reliable and valid and the framework is acceptable. The 2016 Report by Trai¹ states that the density of mobile users is increasing in rural area.

The report’s data clearly indicates the growing penetration of mobile technology in the rural areas of India and how effective mobile technology can help in financial inclusion. Research is growing in the area to measure usefulness of mobile telephony in enhancing financial inclusion which will in turn lead to growth in various related sectors. In a study cross-national data was studied which concluded positive relation between mobile acceptance and national output by Waverman (2005). In India a study by Kathuria in 2009 shows that mobile penetration in Indian states is associated with a positive and statistically significant improvement in output. Various studies have been done to measure the impact of mobile technology on state income, mobile technology and financial income but all over India no study has been done so far.

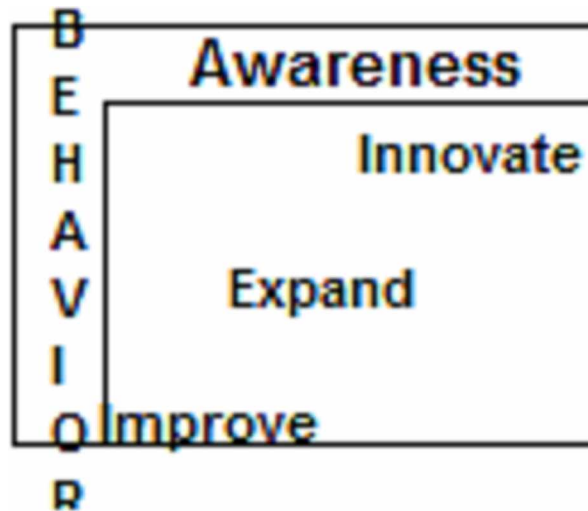
Table 1. Pointers for financial inclusion

Technology disruption will bring services to people at low cost.	Electronic payments and Big Data will have an impact.	Regulatory reforms will decrease number of unbanked customers.	Effective communication between stakeholders can create value for customers.	Financial education through applications will lead to financial inclusion	Government has to intervene for effective payment and delivery mechanisms.
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Education to rural population about banking services and products is being provided through many apps and videos. Skill building for bottom of the pyramid is also an important step for millions of people. Education institutes have to revamp their delivery mechanism to reach out to the population now using such technology. Banks and other financial institutions installed technology-intensive solutions like a small machine to give token in SBI, Noqueue app at SBI to issue token even before you reach the bank branch anywhere in the city. This has led to increase in revenue, enrich customer experience, minimize cost and balance the risk. But more reforms need to be ingrained to deliver fast track solutions to the consumers. In the model below, consumer awareness and behavior are compared to derive knowledge dissemination for improving financial literacy (Figure 1).

This shift towards internet banking is changing the delivery and payment routes in banks – financial institutions – government etc. With more working population, Indian banks need to implement fast track solutions with business intelligence and analytics to drive their overall profitability. RBI has also encouraged banks to adopt BI to increase transparency and control over the banking business.

Figure 1. Financial literacy dissemination



Financial literacy is associated with the consumer who understands the products and purchases them or understands how to use / get the financial information using technology. It is mostly based upon knowledge, skills and attitudes. Financial literacy or financial education can broadly be defined as ‘providing familiarity with and understanding of financial market products, especially rewards and risks, in order to make informed choices. Viewed from this standpoint, financial education primarily relates to personal finance to enable individuals to take effective action to improve overall well-being and avoid distress in matters that are financial’ (RBI). Thus it is more than merely providing information related to money but more related to complexities of financial dealings. It is the capability to know and observe financial security decisions pertaining to self. (Reddy, 2006)

The history of financial literacy is taken from a renowned source as it is very interesting. The snapshot gives outline of the development of mankind into learning the basics of bank communication till date. In a letter to Thomas Jefferson, dated August 23, 1787, John Adams recognized the need for financial literacy: “All the perplexities, confusions, and distresses in America arise, not from defects in their constitution or confederation, not from a want of honor or virtue, so much as from downright ignorance of the nature of coin, credit, and circulation.” In 1914, the Smith-Lever Act was passed which was aimed to provide learning experiences for skill development of people including. Slowly financial literacy started to grow and after 1947 in India too the need was felt to educate everyone. Around 1970 many organizations focused attention towards youth education. Dr. Lewis Mandell developed the financial literacy survey (as discussed above) to help organizations involved to spread education. After 2000 with the opening up of global boundaries need for consumer education was felt for finance or banking activities. United Kingdom (UK) started a national strategy on financial capability which was spread widely in various countries. OECD worked on developing similar principles for financial literacy to improve the status of education. Reserve Bank of India launched an initiative in 2007 to establish Financial Literacy and Credit Counselling Centers throughout the country. This initiative was aimed at providing free financial education and counselling to all population. 2008 was declared as the year of financial education by the Indonesian government. The U.S. Congress passed the Dodd-Frank Act, to promote financial education among consumers. State Bank of Pakistan (SBP) launched a national financial literacy program (2010),

The Central Bank of Sri Lanka announced financial education initiatives (2011), In Uganda (2011) consumers were trained in financial literacy and Bank of Guam became the first bank in Guam to offer interactive financial literacy games. UK's Department for Education determined that financial education will become compulsory in all schools beginning in September 2014. (Andrianaivo, 2012)

Financial markets have become multifaceted with numerous intermediaries offering numerous services and products. This causes information asymmetry leading to confusion and chaos for the rural people to make good selection. Therefore programmes which focus on spreading financial knowledge are growing in all countries. In India most of the population is in rural areas and a large section of the population still does not have good financial set-up. India has people with diverse social and economic profile staying together and the spread of financial literacy therefore is more difficult.

Many initiatives have been taken by Reserve Bank to teach about bank related concepts but the spread is slow. A project titled 'Project Financial Literacy' aims to teach and spread knowledge related to money, schemes by government for the benefit of the people. The people will also get information related to banking in daily life and general concepts. The information will be in many languages.

Stakeholders embracing the related goals of financial capability and financial inclusion requires a multi-stakeholder framework built around consumers, the financial services industry and government. Financial education is the nexus linking their interests in these common goals. Non-governmental and community-based organizations use it to promote livelihoods and asset building for the poor, integrating it into a range of activities that includes extension services, health education, business-development training, or mentoring. Financial institutions use it to enhance their community profile, increase adoption and use of their products and ultimately, improve performance. Central bankers and regulators embrace financial education to protect consumers from fraud and abuse (Cohen, 2010).

The mobile banking models in India for financial inclusion are: a) Bank led Model – In which all banking services are provided to the customer using simple technology. b) Joint Venture Model – In which Bank collaborates with Telecom operators to provide basic financial services through mobile wallets. c) Third party Model – In which Banks, Telecom operators join hands with third party enterprises to provide banking services.

REVIEW OF LITERATURE

According to the Planning Commission (2009), (RBI, 2018) Financial inclusion refers to universal access to a wide range of financial services at a reasonable cost. The household access to financial services includes access to contingency planning, credit and wealth creation. On the other hand, access to wealth creation includes savings and investment based on household's level of financial literacy and risk perception.

GOI (2008) defines Financial inclusion as the process of ensuring access to financial services and timely and adequate credit where needed by vulnerable groups such as weaker sections and low income groups at an affordable cost (RBI, Bank-wise volumes in mobile transactions, 2017). The meaning of financial inclusion is delivery of financial services to the low income groups especially the excluded sections of the population with the provision of equal opportunities.

A very popular and noteworthy theory to understand adoption of a technological innovation by an individual is the Diffusion of Innovation Theory (DIT) (Sriram, 2016). It was developed by E.M. Rogers in 1962 and originated in communication to explain how, over time, an idea or product gains momentum

and diffuses (or spreads) through a specific population or social system. This theory can explain the reasons behind the rate of spread and penetration of any technological innovation.

Technology Acceptance Model (TAM) proposed by Davis comprises two beliefs, the perceived utilities and the perceived ease of application, which determine attitudes to adopt new technologies. Behaviour of the individual toward adoption will be either positive or negative concerning whether the decision is driven by intention or trust.

The unified theory of acceptance and use of technology (UTAUT) is a model formulated by Venkatesh and aims to explain user intentions to use an information system and subsequent usage behaviour (Andrianaivo, Mobile phones, financial inclusion and growth, 2012). It has four core constructs (performance expectancy, effort expectancy, social influence and facilitating conditions) which determine behaviour and in turn are moderated by gender, age, experience, and voluntariness of use. It is argued that by examining the presence of each of these constructs in a “real world” environment.

Abhishek and Abhinav (2016) in the paper used the above mentioned theories to reveal that perception towards usefulness, ease of use or risk aversion plays an important role towards degree of diffusion of mobile banking in rural setup. The result of their paper proposes that banks and financial institutions need to study the degree of perception towards credibility risk before upgrading the technology. The study is done in the area of Rajasthan in India (Kathuria, 2009)

Shubhashis (2009) paper focuses on developing complete solutions and not on restatements of the problem. It tries to define the regulatory framework that encourages greater and universal access to financial services based on a technology platform that allows solutions that are otherwise infeasible. It says that the objective of such technology is not one that earns more revenue from existing market participants but increases the number of participants (Basu, 2013).

KPMG report (KPMG, Customer Adoption of Digital Initiatives, 2016) concludes that banks need to focus on developing compelling products that proliferate active customer adoption. As the unbanked pool reduces over the next few years, due to both physical as well as digital initiatives, the next wave of growth is expected to come by focussing on the underbanked. There is a need for players to adopt a holistic approach on going digital and integrating business strategy with all constituents of their operating model ecosystem to create a remarkable customer experience.

Department of Payment and Settlement Systems (RBI 2016) developed a framework that takes account of the interaction between the demand-side and supply-side payment. It studies to calculate cost of cash limited to certain types of payments. McKinsey found that India could save up to USD 22.4 billion annually by shifting to all electronic government payments. A study by the Fletcher School, Tufts University showed that the RBI and commercial banks face USD 3.5 billion in currency-operations costs annually. Another study by the Institute of Business in the Global Context, the Fletcher School, Tufts University, found that card users in urban India use cash in 73 percent of expenditures compared with only 17 percent by card. (RBI, Role of Financial Education, 2016)

Sriram (2016) in the paper reviewed literature on financial inclusion in the Indian perspective to highlight the awareness level of financial inclusion, digital financial inclusion and barriers confronted to financial access. The vision of the Reserve Bank for the year 2020 is to open more than new 600 million customer accounts. It is expected from the government to encourage the banks to adopt financial inclusion for proper financial assistance using technology to achieve full inclusion.

According to a recent document by Morgan Stanley (2015), India’s e-commerce market is set to expand from USD 3 billion in 2013 to more than USD 100 billion by 2020. Of the 354 million Internet users in India in June 2015, over 200 million were first-time users (Internet and Mobile Association of India

website). The confluence of these positive factors offers tremendous opportunities for banks and mobile service providers to leverage their strengths and explore the expanding opportunities. (Stanley, n.d.)

Several books, reports and articles were used, of which some of them have been referred below: Deputy Governor of the RBI, K. C.Chakrabarty, in his address titled “The What, Why and How of Financial Literacy” in 2013 talked about issues relating to financial literacy in India. The talk was focused on importance of financial literacy for our people today and the suggestions to improve education at all levels to all people especially backward. (EY, 2015)

“National Strategy for Financial Education” published by the RBI in 2012 traces the origin of financial literacy to 17th century and the need for it. It says that government intervention and policy framing merely will not help in the spread of financial education but the stakeholders too have to play important role. A survey was conducted to find literacy level in all countries in comparison to the population. We lag behind a lot considering that we will have the max working population soon.

PwC is another agency which carries out surveys to understand the need of consumers today. In its 2012 report banking sector is an important growing sector with revolution in technology and services. Payment and deliver mechanisms are also changing. IMF publishes reports every year to state the outlook for every country and world. It has also projected that telecom / internet and mobile will revolutionize delivery and payment of financial products and services. Book by late Dr. APJ also discovers that to be in the top nations India has to develop models for effective banking and educate people regarding the same.

From the research it was evident that the levels of financial literacy in the area were very low. This is something that must be addressed rapidly. RBI and SEBI must come up with fun school / college activities on-line to improve financial literacy for school and college students. Finance or money management in day to day life, importance of saving, banking, etc can be taught to enhance their skill set. In many rural areas the population is too low and this is also a reason for the poor and unbanked to get access beyond.

MAIN FOCUS OF THE CHAPTER

From the above literature it is clear that to achieve financial inclusion enabling financial services using mobile technology is a good option for India. But creating awareness requires designing financial literacy apps based upon mobile phones for spreading banking services which would be acceptable and accessible by the poor individuals or unbanked population. The focus is also to check if financial literacy can help in the growth of financial inclusion and sustainable development. The chapter aims to discuss importance of financial literacy in today’s extremely consumer centric scenario for diffusion of mobile services in rural areas. The survey conducted has enabled us to develop a conceptual framework / Model using mobile technology for improving financial inclusion in rural India.

Objectives of the Study

1. To discuss importance of financial literacy for diffusion of mobile banking in rural areas.
2. To develop a conceptual framework / Model using mobile technology for improving financial inclusion in rural India.

Hypothesis

- H1: Individual is ready to Adopt Technology for financial literacy.
- H2: Individual will use the mobile app for mobile banking.

RESEARCH METHODOLOGY

Data collection was done using a structured questionnaire. Special care was considered regarding the reliability and validity of the questionnaire as the constructs were drawn from existing models. The questionnaire aimed at recording demographic data as well as responses on the items used to measure the constructs. The responses to second part of the questionnaire were recorded using a five point Likert scale with 5 being strongly agree and 1 being strongly disagree. The target audience was selected from different regions in India like Pune, Mumbai, Goa, Kerela, Noida, Ludhiana (17 states) etc. The cities were selected at random and the respondents were selected from nearby villages. The questionnaire was converted in local language so that correct data could be recorded.

ICICI Bank has launched a mobile banking app – Mera iMobile – for rural customers that allows them to access banking services as well as information on agricultural related services. The app is available and is operational in 11 languages. We also took help of this app and bhim app recently initiated by our government. It allows users in rural areas to avail many 35 services on their mobile phones. The services include Kisan Credit Card, Gold Loan, Farm Equipment Loan and loans to Self-Help Groups (SHGs). It also gives crop-wise mandi prices of the area across mandis. “Lime” by Axis Bank is also a similar app, 18 M-Wallet by BSNL, Citi MasterPass are few e-allets providing similar services.

The study recorded 146 complete records out of which 125 respondents with complete information were taken for analysis. SPSS was used for the process of data mining. The fitness of measurement model using Confirmatory Factor Analysis (CFA) is employed to test whether the measures of a constructs are consistent with the researcher’s understanding of the nature of that construct. There are two methods of running the CFA namely CFA for individual model and the CFA for pooled measurement model in determining the reliability and validity of the framework. Details of Constructs with their references is given in the table below:

DATA ANALYSIS

A dummy mobile app was run on simple Nokia mobile phone 1280 and 1600 Similar to Bhim² App). Data was collected through structured questionnaire. Analysis was done using SPSS Table 3 below shows how the variables are placed. The questionnaire was filled by 63 females and 62 males from all over India. Literacy level among the respondents is 25 Illiterate, 38 who can read but are unable to write, 56 can read and write whereas 6 respondents can read, write as well as converse. Language is mostly local and the mobile app shown to them can be in their convenient language.

Descriptive Statistics was done for the data to find significance between Literacy and if the respondents are ready to adapt or adopt banking transactions using mobile application. The Pearson Correlation shows that only 35% approx. respondents are ready for adapting remaining still want to go to the bank for any banking transactions. During the interview respondents stated that personal interaction in banks

make them felt comfortable and builds the trust for money related matters (financial matters). SPSS Results are shown below in Table 4.

The test for degree of freedom was also passed which can be inferred from the table 4. The correlation between literacy and rating the application was also computed shown in table 4. All the values are found to be greater than the acceptable norm.

Table 2. Details of constructs / variables defined in SPSS

Label	Values	Type	Measure
Name	None	String	Nominal
Gender	{1, Male}...	Numeric	Nominal
Village	None	String	Nominal
Age	{1, 20 to 30}...	Numeric	Nominal
Literacy	{0, Illiterate “No read & Write’}...	Numeric	Nominal
User	{N, No}...	String	Nominal
Awareness	{N, No}...	String	Nominal
Frequency of use	{0, Do Not Use}...	Numeric	Scale
Ready to Adapt	{0, Not sure}...	Numeric	Scale
Rate the app	{1, Not Satisfied}...	Numeric	Scale

Source: Variables defined as in SPSS

Table 3. Detailed analysis of data collected

1	Gender	Male 62 Female 63
2	Literacy	M F Total Illiterate (1) 13 12 25 Can read Not write (2) 12 26 38 Can read & Write (3) 32 24 56 Can read, write n talk (4) 5 1 06
3	Use Mobile App for Banking	Male 37 (Yes) 60% approx 25 (No) 40% approx. Female 50 (Yes) 79% approx. 13 (No) 21% approx
4	Awareness about Bank Operations using Mobile App	Male 37 (Yes) 60% approx 25 (No) 40% approx. Female 50 (Yes) 79% approx. 13 (No) 21% approx.
5	Frequency of Doing Financial Transactions using Mobile App	Male Do Not Use (0) 4 Very Less Use (1) 12 Moderate Use (2) 28 Lot of Times (3) 18 Female Do Not Use (0) 2 Very Less Use (1) 8 Moderate Use (2) 25 Lot of Times (3) 28

Table 4. Descriptive statistics and correlation using SPSS

Descriptive Statistics

	Mean	Std. Deviation	N
Ready to Adapt	1.55	.745	125
Literacy	2.34	.853	125

Correlations

		Ready to Adapt	Literacy
Pearson Correlation	Ready to Adapt	1.000	.346
	Literacy	.346	1.000
Sig. (1-tailed)	Ready to Adapt	.	.000
	Literacy	.000	.
N	Ready to Adapt	125	125
	Literacy	125	125

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.346 ^a	.120	.112	.702

SOLUTIONS AND RECOMMENDATIONS

The developed model was accepted by the respondents and therefore is found to be valid. The first Hypothesis (H1: Individual is ready to Adopt Technology for financial literacy) has given positive result as respondents want to use technology for learning the new schemes. But second Hypothesis (H2: Individual will use the mobile app for mobile banking) has proved of no significance or negative as most of the respondents still feel comfortable going to the bank for transactions. . The study was aimed to build a reliable and valid framework for “Readiness for adopting technology” based on the inputs collected from various respondents. The perception of an individual is usually split into “Ease of Use” and “Usefulness”.

All the stakeholders together should join hands to integrate elements of Technology, government regulation and public private enterprise to provide easy and low cost telecom / mobile enabled services to the unbanked or rural poor. This will ensure spread and increase trust of consumers towards banking products and services using mobile technology. Inclusive and efficient financial markets will drive the growth and improve economic collaboration which will lead to reduction in cost and ease of delivery and payment mechanisms.

People do not fully appreciate the need for bank and loans via formal sector are more useful than the informal sector. Government and Reserve Bank of India have been making continuous efforts to increase financial inclusion, new methods to educate people regarding financial services. Financial illiteracy and

low awareness is also resulted in low penetration of financial services. More benefits should be given to banks operating in the rural India, awareness can be created by BCs or Sarpanch of the village, One person can be trained per village and he/she can educate the rest of the people. Preference should be given to a physical branch as the rural people trust the branch more than technology. The existing network of post offices can be transformed as advice or training centres. Schemes should be different for different area and people. Financial literacy should be included in school education needs to be given importance in schools, and student small saving programs, wso that the students will be aware. Regular audits by the government will help to improve the conditions in remote area.

FUTURE RESEARCH DIRECTIONS

Research can be done to understand why and how unbanked population can be made literate, education models and ways to reach can be found. Also schemes which they would benefit from should be thought of. Technology can be more simplified, infrastructure should be good in remote area to help in penetration. In this competitive environment large intermediaries which have strong base will merge / acquire small institutions to strengthen the base and smaller companies lack economies of scale. But these institutions have to keep in mind that the potential lies at the bottom of the pyramid. Methods of keeping track of the payments made directly to the accounts should be mandated and mechanisms should be strong. A strong system of digital identity has to be made leak proof to avoid identity theft.

To address the problem of implementation of technology all the barriers should be removed, improve the computer/digital literacy among rural unbanked people. RBI and Government have to take measures to ensure that the implementation of digital technology is good and is in the concern of people which will help to create a friendly environment for growth and sustainability. To become a developed nation financial inclusion should be complete and digital technology can help in doing so if implemented in an efficient way.

CONCLUSION

India will soon have the largest population in the working age group which will bring technological revolution. Therefore the need and importance of spreading digital literacy and financial literacy is significant as the demand for all the other related factors will rise. The chapter wanted to find if financial literacy is important for using mobile technology and if people are ready to adopt banking services using mobile. More measures should be taken to discuss with rural people about the importance of financial literacy and security issues regarding their data for banking purpose. It will help to improve inclusive growth as the present study discusses the acceptance of digital literacy around the globe. There are various challenges and opportunities for digital literacy in India, but for real inclusion concerted efforts at all levels may help to achieve financial inclusion.

The initiatives aim at creating an ecosystem to support people for banking services daily. People usually look at four important points for banking - - payment, credit, insurance and investment. Indian people are savers and investors but only 40% plan investment whereas 60% do not invest and the money does not enter the financial system. Financial literacy is the backbone of a strong financial system. Financial literacy and financial education should be on the agendas of educators, businesses, government

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agencies, policy makers, NGOs and the issues should be dealt with policy reforms at the national level. Thus, it is important to achieve highest possible financial literacy in the country as its benefits are not restricted to an individual or family, but to the society and the macro economy as a whole.

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KEY TERMS AND DEFINITIONS

Aadhar: Is a 12-digit unique identification number issued by the Indian government to every individual resident of India. The Unique Identification Authority of India (UIDAI) functions under the Planning Commission of India.

BC & BF: Business correspondent is nothing but a bank-in-person that is authorized to collect small ticket deposits and extend small credit on behalf of the banks. Bank facilitators operate a number of channels through which they deliver financial services.

BCG: Boston Consulting Group (BCG) is an American worldwide management consulting firm.

Bhim: Bharat Interface for Money is a mobile app developed by National Payments Corporation of India (NPCI), based on the unified payment interface (UPI).

GDP: Is one of the primary indicators used to gauge the health of a country's economy. It represents the total dollar value of all goods and services produced over a specific time period.

Goerdeler: Is a professional service company and one of the big four auditors.

GSM: Global system for mobile communication is a digital mobile telephony system that is widely used. It uses a variation of time division multiple access (TDMA) and is the most widely used of the three digital wireless telephony technologies (TDMA, GSM, and CDMA).

GSMA: The GSM Association is a trade group that represents network operators that use GSM technology for their networks. The GSMA also counts a number of manufacturers and suppliers that provide the GSM technology as associate members.

IBEF: Is a trust established by the Department of Commerce, Ministry of Commerce and Industry, Government of India.

KPMG: Was formed in 1987 with the merger of Peat Marwick International (PMI) and Klynveld Main.

PPP: Is a contractual arrangement between a public agency (state or local) and a private sector entity. Through this agreement, the skills and assets of each sector (public and private) are shared in delivering a service or facility for the use of the general public.

RBI: Central Bank of India established on April 1, 1935 in accordance with the provisions of the act.

SPSS: The software name originally stood for Statistical Package for the Social Sciences (SPSS), reflecting the original market which is used by researchers to do statistical analysis in many fields.

UPI: Unified Payments Interface (UPI) is a payment system launched by National Payments Corporation of India and regulated by the Reserve Bank of India.

ENDNOTES

¹ See http://www.trai.gov.in/sites/default/files/Indicator_Reports_Dec_16_07042017.pdf

² See <http://www.npci.org.in/documents/BHIM-User-Manual.pdf>

Chapter 34

Mobile Wallets in India: A Framework for Consumer Adoption

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ABSTRACT

Adoption of technology by the Indians is setting an example for the others. Considering the penetration of mobile phones and its usage success stories all over the world, a good number of companies are exploring new uses of mobile technology. Many companies have come up with a new use of mobile technology, mobile wallets. This research article has been undertaken to understand the previous research work on the adoption of mobile technology in the developed countries and the factors that are influential to understand the reasons for such adoption. The Unified Theory of Acceptance and Use of Technology (UTAUT) Model has been taken as a base for understanding the adoption by Indian consumers and two factors namely – Trust in mobile wallet services and trust in mobile wallet service providers have been examined for their impact on its adoption. A survey was conducted across Delhi NCR to examine attitude of Indian consumers for mobile wallets adoption.

1. INTRODUCTION

The rise in e-commerce industry is a big hit for a developing nation like India. E-commerce has opened new gateways to provide more convenience to its customers through its better services and make the things easier and hassle-free. The entry of retailers on the virtual platform is transforming the Indian consumers and their buying behaviors. The shopping orientations are changing from being experiential shopping to convenient shopping and the aspiration for further convenience is simply rising. Adoption of technology by the Indians is setting an example for the others.

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The attraction towards online shopping is extremely high, the reason being huge and exciting discounts and offers to the consumers if they shop. There have been a good number of drawbacks which lessen the charm of shopping online. The highest amongst all is the issues rising due to making payments to these virtual vendors. A study conducted by Priya (2014) revealed that Debit Cards and Net banking lead the segment of payments through online mode with 61% followed by credit cards (50%), COD (24%), prepaid cash cards (10%) and the last in the row is Payments through Mobile which is merely 3%.

Considering the penetration of mobiles and its usage success stories all over the world, a good number of companies are exploring this new mode of making payments. A mobile payment system in Kenya, M-Pesa, had been successful in targeting socio-economic groups and geographies and simultaneously drawn its attention to mobile as a provider of financial services. M-Pesa as a payment system has fulfilled many of the immediate needs of people like safety and convenience associated with cashless payments, and ease of money transfer.

The growth of smart phones is projected at a lightning speed. The results from a survey conducted by Gartner revealed the growth in the number of smart phones users in India by 2018 will be as high as 500million. Additionally, many of these smart phone users between these three years will use the internet for the first time. Hence, this segment of consumers represents a huge area of potential for the companies.

Hence, under the given situations while considering the changing dynamics of consumers and markets, the need for undertaking research is urgent. This study explores the factors influencing Indian consumers in adoption of mobile wallet services. It applies the Unified Theory of Acceptance and Use of Technology (UTAUT Model) to propose a research model that incorporates trust and promotional deals as enhancing constructs to predict users' motivations for adopting a mobile wallet.

2. BACKGROUND

2.1. Changing Dynamics of E-Commerce

Customers are dynamic in nature and they are changing at a very fast pace with the advancement of technology and information technology is central in catering and affirming customer needs. A study emphasized that technology can enhance an individual's feelings of competency and control (Unruh, 1996). Moreover, the internet based interactive technologies and online services offer an ever-broadening array of options to customers for handling their service transactions.

With the advent of e-commerce, customers changed their shopping modes and started taking interest in online shopping. Online shopping raised the usage of debit and credit cards, net banking, etc to promote more and more shopping. With the development of technology, the range of devices and processes to transact electronically are also rising continuously. This has led to reduced number of cash and cheque transactions.

Consumers have an option to choose amongst the different ways to pay for their e-commerce transactions based on their preferences. The selection of the same is based on certain criteria like convenience, security, availability, etc. But, the issue is that most of these tools still fail to gain sufficient support from online merchants (Hsieh, 2001). A study conducted by Worthington (2005) concluded that developing countries have a lot to do to establish an infrastructure for payment cards and also to encourage consumers to hold and use such cards.

Mobile Wallets in India

Developing countries like India rely much more on electronic funds transfer and smart cards based electronic payment system. Eventually, credit cards are becoming one of the most preferred methods of payment in India (Sumanjeet, 2008). In his study (2009), he remarked that different countries prefer the different forms of electronic payment system. The consumers have been looking at credit card payments on the internet as one of possible time-tested alternative, but this payment system has raised several problems before the consumers and merchants. The payments done through credit cards suffer from many limitations like security, merchant risk, high costs and affordability. Additionally, credit cards have the highest possibility of frauds (Prabhu, 2014).

These developments have led to the evolution of mobile technology in the recent years. Being one of the major technological developments, the smart phones have become an integral part of our daily lives. Therefore, with the rising population and smart phone penetration, India is going mobile and digital (Srivastava, 2014). India had an impressive 930.2 million mobile phone subscribers (compared to 27.41 land line subscribers). According to a report of TRAI, 2014 penetration of broadband was higher in case of mobile phones (60.19 million subscribers) than the land line subscribers (15.13 million). India was the sixth largest mobile market and in 2013-2015 its growth rate was expected to be 459.7% pushing it to third position globally (Azevedo, 2014).

Although the number of mobile internet users in India is low, share of traffic (in terms of page views) on mobile devices is more than the traffic on desktop. Smart phones are versatile in nature as these devices perform many tasks simultaneously along with the usage of internet. The latest generation of smart phones is increasingly viewed as handheld computers rather than as phones, due to their powerful on-board computing capability, capacious memories, large screens and open operating systems that encourage application development. Mobile devices are predicted to become the primary Internet access tool by 2020 (Agefi, 2014).

Mobile technology had proliferated across India for communication, but its use for financial services has not yet become popular even though it has widely demonstrated its economic benefits (Anyaso & Otubo, 2009).

2.2. Mobile Payments

Mobile payments have been in use for many years and have gained ground (Dahlberg, Mallat, Ondrus & Zmijewska, 2008). It incorporates advanced versatile application including membership cards, loyalty cards and travel cards apart from the basic elements of mobile transactions (Shin, 2009). Mobile payment instruments can be considered in the category of electronic money including all sorts of non-card and non-cash payments (Singh, 1999). It can be defined as any payment in which a mobile device, such as a mobile phone or any other device capable of connecting to mobile communication networks, is utilized to initiate and confirm a commercial transaction (Au & Kauffman, 2008).

At the initial stages, mobile wallets faced issues in all developed countries as there were not enough places for the consumers to use this technology (even 2 years after its launch). Another major obstacle faced by the companies earlier was that of customer apathy (Viehland & Leong, 2007).

To overcome the problems and issues faced by Indian consumers, the company came with an innovative solution – payments through mobile. Indian government is committed to set up a robust digital infrastructure and to promote the adoption of mobile internet and related products and services (A report by KPMG-IAMAI 2015).

The availability of low-cost smart phones as well as data plans has made the penetration of smart phones easier in the Indian markets (Mallya, 2015). A report by KPMG-IAMAI (2015) uncovers that the usage of smart phones has been constantly changing with the changing times. They try to deliver a better user experience with the extensive adoption of mobile internet and the traditional services like voice, SMS are gradually being replaced by mobile data services.

With the increasing popularity of mobile wallets, the issues that can be raised include: Positioning of the mobile wallets viz –a –viz plastic money, replacement of real wallets by these virtual wallets, acceptance of mobile wallets by Indian consumers and what can be the drivers to motivate Indian consumers to adopt them.

3. LITERATURE REVIEW

The theoretical foundations of technology adoption, payment and banking were examined and a special focus was laid on the empirical studies that deal with mobile technology adoption, mobile payments and wallet adoption. The first model to study the individual intentions to adopt technology i.e. Technology Acceptance Model (TAM) was introduced by Davis (1989). Since, this study deals with the investigation of adoption of a new technology by the consumers, TAM is the most effective tool to diagnose. TAM was an early attempt to apply psychological factors to information systems and computer adoption (Shin, 2009). Its assumption is that perceived usefulness and perceived ease of use were major drivers to form an individual's attitude and actual usage of technology.

3.1. UTAUT Model

The Unified Theory of Acceptance and Use of Technology (UTAUT) is the extension of TAM and a number of studies have proved the validity of the framework. UTAUT aims to explain users' intention to use an information system and their subsequent usage behaviour. The theory focuses on three direct determinants of behavioral intention (performance expectancy, effort expectancy and social influence) as well as two direct determinants of usage behavior namely facilitating conditions and behavioral intention (Venkatesh et al., 2003). Also, the demographical variables (age, gender, experience and voluntariness of use) act as moderators to impact the usage intention and behaviour.

As indicated in the research work conducted by Lai D. et al. (2009) UTAUT integrated constructs across eight models. The modified UTAUT model will enable a better explanation of mobile wallet acceptance and usage behavior.

The validity of UTAUT Model for technology adoption in several contexts have been studied by several researchers (Alawadhi and Morris, 2008; Zhou et al., 2010). Moreover, the UTAUT Model explains 70% of technology acceptance behavior intention; which is higher in comparison to other models (Venkatesh et al., 2003).

Lee (2005) confirmed that trust plays a significant role in determining consumer transaction intentions. The argument was supported by Lin and Wang (2006) in their study which concluded that perceived value and trust were found to be directly related to customer satisfaction and loyalty. He and Mykytyn (2007) investigated the factors for consumer adoption of online payment systems. They concluded that although the people were favourably inclined towards the concept of mobile payments, their primary consideration was '*risk associated with making online payments*'.

Research studies on the adoption of mobile payments include a study by Pousttchi and Widermann (2008) which examined the key influencers that affected consumers to use mobile payments. They concluded that there is a strong correlation between perceived confidentiality of payment details and perceived trustworthiness. Another study undertaken by Chen (2008) revealed that consumer acceptability for mobile payments was determined by four factors including perceived use, perceived ease of use, perceived risk and compatibility.

Shin (2009) investigated the mobile wallet adoption by using UTAUT Model and thereby proposed four additional constructs namely: security, trust, social influence and self-efficacy. He further confirmed that perceived security and trust are the main factors that influence consumers to accept mobile wallets. Although prior research has provided insights into technology adoption, its relevance in Indian context is an important knowledge gap.

3.2. Trust

Various authors and researchers have proposed important dimensions of consumer trust and that also in an online environment. This concept has gained much of significance being the fundamental aspect of every relationship. Absence of this principle can prove to be fatal for the company in terms of losing customers and goodwill. Online trust is a key differentiator that determines the success or failure of many online companies (Lauer and Deng, 2007). Online trust is one of the key obstacles to vendors succeeding on the internet medium (Chen and Barnes, 2007). They declared that perceived usefulness, perceived security, perceived privacy, perceived good reputation and willingness to customize are the important antecedents to online initial trust. As per the research, both online initial trust and familiarity with online purchasing have a positive impact on purchase intention.

The results of the study conducted by (Flavian et al, 2006) confirmed that the trust of the user increases when the user perceived that the system was usable and that there was a consequent increase in the degree of website loyalty. Bauernfeind and Zins (2006) in their study concluded that trust is the most important factor in order to achieve a high degree of website satisfaction which further raises the loyalty levels as well as recommendation for others. Brown et al. (2007) raised an increasing consumer's privacy concern due to increasing usage of ICTs to facilitate relations with consumers. Research indicates that this can have an adverse impact on the consumer's willingness to purchase online.

Some recent research has emerged in related areas and in other emerging markets that can shed light on mobile payments adoption in India. For example, one study on adoption of online banking by Mexican consumers identified ease of use, compatibility, trust and human contact as key antecedents (Mansumittrchai, 2011). Phutela & Dasgupta (2013) conducted a study and the results revealed that Trust followed by privacy and security are the critical success factors for e-banking in India. There was a requirement of undertaking research and examine Indian consumers attitudes and beliefs towards technology and specifically towards mobile payments.

4. CONCEPTUAL FRAMEWORK AND MODEL DEVELOPMENT

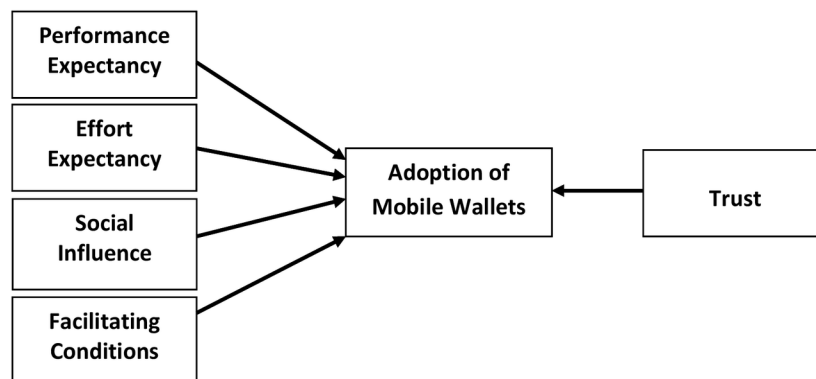
Based on the review and findings of previous research work on mobile technology acceptance, online payments, mobile payment adoption and mobile wallet adoption, this paper proposes a research model that integrates the constructs of UTAUT constructs: includes performance expectancy (i.e. expectation

that the technology will improve performance), effort expectancy (i.e. ease of using the technology), social influence (i.e. degree to which others’ believed the technology should be adopted), and facilitating conditions (i.e. extent and type of support provided for adopting the technology) and Trust. This research aims to fill a critical gap in knowledge of adoption of upcoming technology of payments through mobile by Indian consumers. To examine the influence of various factors considered in the research model on the mobile wallet adoption, following hypothesis are proposed:

- H1:** Performance expectancy has a positive influence on consumers’ adoption of mobile wallets.
- H2:** Effort expectancy has a positive influence on consumers’ adoption of mobile wallets.
- H3:** Social influence has a positive influence on consumers’ adoption of mobile wallets.
- H4:** Facilitating conditions have a positive influence on consumers’ adoption of mobile wallets.
- H5:** Trust has a positive influence on consumers’ adoption of mobile wallets.

Based on the above, we present our proposed model in Figure 1.

Figure 1. Proposed research model



5. METHODOLOGY

Exploratory and descriptive research designs were used in this study. Survey Method of descriptive research design is used to obtain the primary data regarding the customers’ reasons for the adoption of mobile wallets. A self-administered structured questionnaire is used as a survey instrument for primary data collection. The survey was conducted in Delhi NCR, India and obtained a sample of 312 adult consumers of socio-economic groups that closely reflect the general population.

The questionnaire consists of 6 constructs consisting of 20 items related to various factors influencing the adoption of mobile wallets; wherein 3 items are related to performance expectancy, 3 items on effort expectancy, 3 items on social influence, 3 items on facilitating conditions, 6 items on trust in mobile payment services and 2 items related to Adoption (Intention to Use Mobile Wallets). The items were presented as 5-point Likert Scale, with 1 indicating that a person “Strongly Disagrees” and 5 indicating a person “Strongly Agrees” with the opinion.

6. DATA ANALYSIS

Amongst the surveyed 312 respondents, 63% were males and 37% were females. As high as 42% of the respondents were in the age-group of 25-34 years; followed by 27% in the age-group of less than 24 years, 15% in 35- 44 years, 10% in 45-54 years and 6% in the age group of 55 years and above.

The construct validity was evaluated by using factor analysis. The value of KMO measure (0.793); was large enough indicating the data adequacy for factor analysis. (> 0.6 recommended value).

In order to obtain the number of factors to be retained for further analysis, Latent root criterion was employed for further analysis. According to this criterion, we can retain only those factors which have latent roots or eigen values greater than 1. In this study, 6 factors were retained for Consumer Adoption which represents 77.98% of the variance (Table 1).

Table 1. Variance and eigen values

Factor	Eigen Value	% of Variance	Cumulative % of Variance
1	12.801	35.557	35.56
2	5.750	15.972	51.53
3	2.812	7.812	59.34
4	2.524	7.012	66.35
5	2.140	5.946	72.30
6	2.044	5.679	77.98

Factor loadings of the items on the retained factors of Consumer Adoption of mobile wallets are exhibited in Table 2. Factor loading is the correlation of each item and the factor which indicates the degree of correspondence between the item and the factor. Only those items with a factor loading of 0.50 or higher (ignoring the signs) are considered significant. The factor loadings of all the items are above 0.650 which indicates their high correlation with the respective factors.

The reliability of scale constructs was calculated using Cronbach's alpha. The measures have strong internal consistency (Table 3). The range for reliability of variables is more than 0.7 (the recommended value).

Multiple Regression Analysis was used for hypothesis testing; with six independent variables: PE, EE, SI, FC, TMW & TSP and one dependent variable – MWA (Mobile Wallet Adoption). Pearsonian coefficients of correlation were computed for various items (Table 4). The results revealed that the correlation between all constructs was below 0.90, (threshold for significant correlation).

7. RESULTS AND CONCLUSION

Table 5 illustrates variables that have an impact on mobile wallets adoption. The research results are summarized in Figure 2. Results reveal that effort expectancy, followed by performance expectancy has the most significant impact on the mobile wallets adoption by the consumers. Respondents prefer to adopt the mobile wallet services as these services are user friendly and useful. They feel that mobile

wallet services are not only easy to make payments, but it has also increased the efficiency in making payments which aggravates the adoption further.

The availability of low-cost smartphones as well as data plans has automatically facilitated the adoption of mobile wallet services. Recommendations of near ones have an impact on the adoption of mobile wallet services. Trust is also a key factor influencing the mobile wallet adoption. The higher the level of trust, more will be its adoption.

Table 2. Factor loadings

Factor	Item Code	Item Description	Factor Loading					
			1	2	3	4	5	6
Performance Expectancy	PE1	Payments through mobile will improve my efficiency in making payments.	.703					
	PE2	I think mobile wallet services allow me to manage my payment activities more efficiently.	.743					
	PE3	Using mobile wallet services would improve my performance in making payments.	.739					
Effort Expectancy	EE1	It is easy to learn how to use mobile wallet services		.839				
	EE2	It is easy to do transaction through mobile wallet services		.835				
	EE3	Payments through mobile are user friendly and useful.		.815				
Social Influence	SI1	I prefer to make payments through other modes than using mobile wallet services as it is in trend			.878			
	SI2	Family members suggest me to rely on mobile payments			.883			
	SI3	People close to me suggest that I should use mobile wallet services			.869			
Facilitating Conditions	FC1	Making payments through mobile does not require any extra support or effort.				.882		
	FC2	I have the knowledge and resources necessary to use mobile wallet services				.771		
	FC3	Mobile wallet services have no technical issues				.824		
Trust in Mobile Wallet	TMW1	Mobile Wallet Services are secure for making payments					.825	
	TMW2	There is no possibility that others will misuse my personal details while I am making payments.					.806	
	TMW3	Mobile wallet services cannot be misused					.831	
Trust in MW Service Provider	TSP1	Mobile wallet services are credible						.852
	TSP2	There is no possibility of leakage of my personal information, while I use mobile wallet services.						.716
	TSP3	It is not possible that connection may be lost while making payments						.649

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Table 3. Reliability of model constructs

Research Variable	No. of Items	Cronbach's Alpha
Performance Expectancy	3	.849
Effort Expectancy	3	.828
Social Influence	3	.765
Facilitating Conditions	3	.812
Trust in Mobile Wallet Services	3	.767
Trust in Mobile Wallet Service Provider	3	.822

Table 4. Correlations

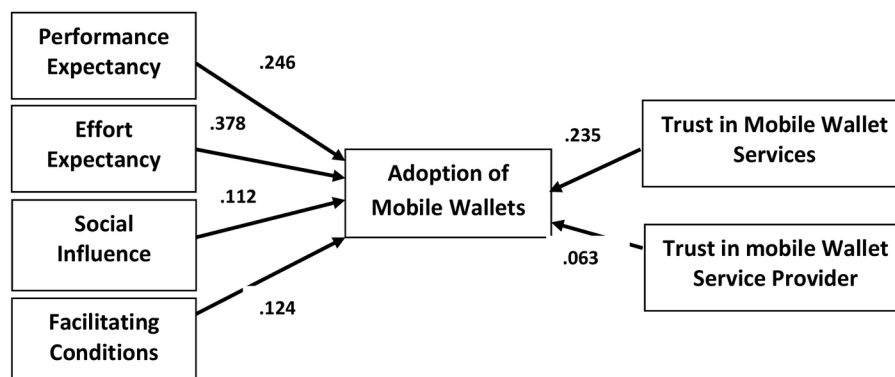
	PE	EE	SI	FC	TMW	TSP
PE	1					
EE	.382	1				
SI	.158	.115	1			
FC	.229	.264	.734	1		
TMW	.023	.315	.321	.147	1	
TSP	.156	.272	.251	.221	.364	1

Table 5. Multiple regression results

	Standardized Beta (β)	t	Sig.
Performance Expectancy	.246	12.250*	.000
Effort Expectancy	.378	13.562*	.000
Social Influence	.112	5.818*	.004
Facilitating Conditions	.124	7.393*	.001
Trust in Mobile Wallet Services	.235	11.395*	.000
Trust in Mobile Wallet Service Provider	.063	2.627*	.009

*significant at 0.01 level

Figure 2. Results



8. CONCLUSION

The results of the study on mobile wallets adoption support the constructs of UTUAT model along with Trust. The study reveals that apart from the basic four constructs of the model namely: performance expectancy, effort expectancy, social influence and facilitating conditions; trust plays a major role in adoption of these mobile wallet services. Hence, the companies should lay more stress on how to build more trust to increase its adoption amongst Indian users.

9. POTENTIAL ACADEMIC AND MANAGERIAL CONTRIBUTION

Mobile payments can change the market dynamics across the socio-economic spectrum. By identifying factors determining the adoption of mobile payments in India and providing a theoretical framework, we aim to contribute to the growing body of knowledge in adoption of self-service technologies. The research findings would enable the industrialists (mobile operators in particular), academicians and researchers. Also, we hope that this research will inform policy decisions in India for using mobile payments as a route towards achieving its financial inclusion goals.

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