

Reinventing Economies and Organizations Following a Global Health Crisis



**Teresa Gomes Costa, Inês Lisboa,
and Nuno Miguel Delicado Teixeira**



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Handbook of Research on Reinventing Economies and Organizations Following a Global Health Crisis

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The pandemic of SARS-COV-2 has significantly affected tourism, and many tourism companies have seen their revenue significantly reduced. Thus, the question arises: ‘How resilient are tourism companies to the COVID-19 pandemic (1st wave) effects on their activity?’ This chapter presents the preliminary results of a broader research project: RE.COVER. Based on a sample of 1,075 tourism companies operating in Portugal, this study describes the impact of the pandemic’s first wave on tourism companies and explores their resilience. Results reveal a high level of impact of the pandemic on tourism companies. In terms of resilience, most companies’ managers are perceived as proactive, and many companies implemented mitigation measures. Even though half of the companies could not find effective responses to the situation, there is, however, one small group of companies that seem to be more resilient, suggesting the need for more investigation on the reasons why.

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Montijo municipality is in Setúbal district and belongs to Lisbon metropolitan area. Many new projects have emerged in the county related to tourism. However, the health crisis that plagued the world in early 2020 raised several concerns about the entrepreneurial activity of this municipality. Thus, this study has as main objective to broadcast the entrepreneurial activity that enhances tourism in Montijo municipality, before the health crisis and to present a reflection on the future of this activity in the post-COVID-19 era. It was possible to verify that the county has a set of positive indicators with regard to tourism activity and is one of the most dynamic at national level in terms of entrepreneurship. Besides that, the

implementation of new business models, new products and services, new distribution and marketing forms, based on information and communication technologies can be very important to disseminate the region and to add value to the tourist experience and business, contributing to making the region a national reference of economic and social progress.

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In a complex business world, startups need to quickly test their value propositions and go to business development as soon as possible with the best strategic fit to the market. Startups that start their journey at academic business incubators are mostly knowledge based or technology based and need adaptable acceleration programmes that allow them to improve their management capabilities at the same time as they achieve market fit and technology development until revenue. This chapter aims to explore some frameworks for acceleration programmes adjustable to academic business incubators and their incubatees, attending best practices already published. In addition, it draws some possible strategies and reflections for a framework as a proposal for acceleration programme at academic business incubators.

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This chapter aims to describe a research work in a real context, focusing on small industries and why they must become more digital, in order to create new and innovative business models and remain competitive in a post-COVID-19 scenario. It also aims to present the challenges small industries will face as a result of the digital revolution ahead, why they should reinvent their business models to be more prepared in the future, and why they should use the pandemic scenario as a lever to make this change faster and more agile. A qualitative methodology is used based on document analysis of use-case information collected from KFactory, a technological consulting startup that works with small industries and helps them identify opportunities and benefits in adopting Industry 4.0. The authors hope that the KFactory case study can contribute to a better understanding of how industries can benefit from technology to improve their production methods, adapt to a post-pandemic scenario, and engage in the new digital revolution.

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manuscript is 1) to identify the effect that the website has on socially responsible buyers and their level of satisfaction; 2) to identify if socially responsible buyers have an effect on customer satisfaction; 3) on the other hand, to demonstrate if the buyer experience has a moderating effect between website security and socially responsible buyers; and 4) verify if the buyer experience has a moderating effect between socially responsible buyers and the level of customer satisfaction.

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Due to the COVID-19 pandemic, most countries are exposed to unprecedented social problems in the current global situation. According to the official reports, it caused a dramatic increase of 44% in graduates' unemployment rate in Portugal. Moreover, from the human resource point of view, the whole of Europe is expected to face a shortage of 925,000 data professionals by 2025. Given the existing situations, the DataPro aims to propose a national-level reskilling solution in big data to mitigate both social problems of unemployability and the shortage of data professionals in Portugal. DataPro project consists of four dimensions, including an online portal for the hiring companies and unemployed graduates, along with a web-based analytics talent upskilling (ATU) platform empowered by an artificial intelligence recommender system to match the reskilled data professionals and the hiring companies.

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The emergence of social payment and usage of social apps for buying and selling services and products was considered as threats to the banking industry. The usage of WeChat in China has fundamentally altered the whole digital communication landscape. WeChat has over 1.17 billion users. During the COVID-19 pandemic, WeChat implemented various plans to help recover from the COVID-19 pandemic, including consumer awareness, WeChat live stream communication platform, and one-to-one consultation through social media services to assist retailers and increase sales. In addition, they implemented WeChat Work 3.0 for remote working during the pandemic, cross-border e-commerce, and Mini Club Program to converts overseas brick-and-mortar shoppers to online members. WeChat and Facebook facilitated WeChat pay and Facebook pay through their social commerce platform because of market power. This chapter discusses the emergence of WeChat and how it impacts the payment systems.

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<i>Tiago Pinho, Polytechnic Institute of Setúbal, Portugal</i>	

The structure of logistic distribution networks is one of the most strategic topics in industrial facility management. This study aims to optimize the logistics structure of the LPR company in Portugal by utilizing the applied analytics methods. In doing so, both locations of facilities and structure of the logistics networks were considered as the target of the optimization process. After analyzing the 12-month historical data of the studied company with more than 8,000 customers and drop points, the optimized logistics structure and warehouse locations were determined that could deduct the logistics costs by 22%. To this end, a linear optimization algorithm was developed to identify the optimum logistic structure among more than 20 million possible network configurations. The proposed solution is applicable in the other industries with logistics operations, helping the managers to make data-driven decisions.

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In recent years, the business environment has become increasingly complex, creating additional risks for companies to manage, resulting from globalization, technological innovation, market competitiveness, more demanding consumers, and changes in companies' ownership structure, presently also due to the pandemic situation. In dealing with this situation, EU funds should play an essential role. Thus, this research study aims to analyze the impact of EU funds on Portuguese companies, considering the companies that have benefited from European incentives under the Qualification and Internationalization Incentive System, since it is directed to financing investments in strategic areas to business success such as internationalization and innovation. Therefore, the sample includes the companies that had projects approved in 2015 and aims to show the impact of these incentives on value creation capacity, as well as employment and internationalization level in the years from 2016 to 2019.

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Financial literacy is an essential skill, and it is even more critical during economic crises. The COVID-19 pandemic affected the global and domestic economies. While some of its aspects are beyond individual control, financial knowledge can help mitigate the economic crisis, manage income, and help people manage their respective finances. In the past decade, Malaysia experienced a volatile financial environment domestically, but the reverberations were also felt regionally and globally. Variations such as inflation, currency and interest rates fluctuation, and increased living costs affected a significant change, not only to the Malaysian economic landscape but also to individuals. These shortcomings were exacerbated during the COVID-19 pandemic due to its resulting cash-flow problems, where some companies reported "zero income" and reversed the economic growth to -6% in 2020. Youth unemployment tripled (11.7%). Cash-flow imbalances occurred due to payroll, business loans, utilities, and other fixed costs that business owners were obligated to meet.

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The COVID-19 pandemic has left the world in complete disarray. Different economies around the world have tackled the COVID-19 pandemic differently, with several monetary and fiscal policies being introduced to combat the devastating effects the pandemic has had on the economy. This chapter focuses on some of the most economically powerful countries and their policies to overcome pandemic-related adversities. More importantly, it gives insights on how COVID-19 is different from earlier crises in terms of its characteristics and also in terms of the uniqueness of the initiatives taken by the major economies in mitigating its impact. The chapter also discusses how the new-age technologies can help manage this crisis better. The study also discusses the implications for the policymakers, the governments, the executioners, and the think tanks or consultants to the decision makers.

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This chapter aims to critically analyze both the world economy and the deglobalization processes under the assumption that they are the result of a dialectical evolution of economic, financial, political, and sanitary crisis. This dialectical movement of the history of the globalization and deglobalization processes is always a very complex phenomena of interactions between the economic agents and political actors, leading to both progressive and regressive events of economic growth, social development, and environmental sustainability. After a period of intensive economic, trade, and financial integration in the creation of a world economy system, suddenly the economic, financial, and sanitary dysfunctions emerged at the interior and created a reactive deglobalization process. However, what has been at the center are the international cooperation and trade relations determined by the need to expand the possibilities of satisfying human needs, including culture.

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This chapter aims to analyze performance differences between family and non-family firms. Additionally, it aims to see if economic downturns and upturns cause impact in this relation. For it, a panel data of Portuguese non-financial-listed firms in Euronext Lisbon during the period from 2010 till 2019 is

analyzed. Performance is studied in accounting-based and market-based views. Three types of variables are considered: corporate governance characteristics, macroeconomic factors, and firm's characteristics. Results depend on the performance proxy used. While to ROA no difference is found, Tobins' Q family firms outperform non-family ones, but results are the inverse using ROE, MTBV, and MVA. Moreover, macroeconomic fluctuations are relevant to explain firms' performance, specially to family firms. Therefore, firms must analyze specific characteristics to avoid losing value, especially in crisis periods.

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The business environment is increasingly complex and demanding, and companies now face a pandemic situation with severe repercussions for the global economy. With this in mind, it is clear that the information provided by financial analysis is more than ever an essential instrument for management control, for decision making. Value creation is considered one of management's primary objectives; however, there is still no consensus on the superiority of value-based measures over traditional measures based on profit. The study intends to highlight the importance of complementing the financial analysis, based on traditional valuation measures, using value creation as an essential management control instrument. Thus, using the case study methodology, an analysis of historical performance will be performed using data from a company listed on Euronext Lisbon from 2014 to 2018. Economic Value Added (EVA®) was used to measure value creation.

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This chapter aims to analyze the impact of the global 2020 pandemic on the banking sectors of the Czech Republic, Hungary, Poland, Romania, Russia, and Slovakia countries in the period from January 2, 2017 to August 10, 2020. The results of the Gregory-Hansen test, in the covid subperiod, show 27 integrations (in 30 possible). When comparing the pre-covid and covid subperiods, the level of integration has increased 386% between markets, which could call into question portfolio diversification, validating the first research question. In corroboration, the authors have verified that the results of Granger's causality tests, in the COVID-19 subperiod, increased significantly. In view of these results and bearing in mind the results of integration, they can show that the crisis caused by the global pandemic of 2020 has increased the synchronization between these regional banking sectors, significantly decreasing the hypothesis of implementing efficient portfolio diversification, thus validating the second research question.

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This chapter aims to analyze the rebalancing of portfolios in the financial markets of China Hong Kong, Malaysia, Singapore, Indonesia, Japan, Philippines, Thailand, South Korea, gold (Bullion(Zurich) kg(995) CHF), silver (Paris Spot E/KG), platinum (Paris Spot E/KG), in the period from 2 September 2019 to 2 September 2020. The rhoDCCA results show that platinum is not a safe port for portfolio rebalancing in these regional markets, while silver is also not a safe port for the markets of Malaysia (KLSE), South Korea (KOSPI). As far as gold is concerned, the authors do not see any strong rhoDCCA which could be a safe harbor for these regional markets in this period of the 2020 pandemic crisis, which partly validates the first research question. The exponents detrended fluctuation analysis (DFA) show pronounced long memories, with the exception made to the gold market that shows signs of balance, that is, the second question of investigation is validated.

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Hortense Santos, Polytechnic Institute of Setúbal, Portugal

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This chapter aims to analyze the efficiency, in its weak form, in the exchange rates of Brazil vs. USA, Australia, Canada, Europe (Euro Zone), Switzerland, United Kingdom, and Japan from July 1, 2019 to September 20, 2020. The results suggest that exchange rates show signs of (in)efficiency, in their weak form (i.e., the values of the variance ratios are lower than the unit), which implies that returns are autocorrelated over time, and there is reversal to the average. In corroboration, the results of detrended fluctuation analysis (DFA) show persistence in yields (i.e., the existence of long memories), thus validating the results of the Lo and Mackinlay model that show autocorrelation between the series of yields. As a conclusion, the authors show that the assumption of market efficiency may be questioned, since the forecast of market movement may be improved if the lagged movements of the other markets are taken into account, allowing the occurrence of arbitrage operations in these foreign exchange markets.

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The numbers of COVID-19 increase daily, both confirmed cases and deaths. All over the world, shock waves are felt with impacts on economies in general and the financial sector in particular. Aiming to assess the relationship between confirmed cases and deaths and the behaviour of stock markets, the authors perform a dynamic analysis, based on the Pearson correlation coefficient, for 10 of the most

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Rodrigo Teixeira Lourenço, Polytechnic Institute of Setúbal, Portugal

Helena Costa Gonçalves, Polytechnic Institute of Setúbal, Portugal

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The COVID-19 pandemic required quick responses from the organizations, making it necessary for them to reinvent and rethink themselves. This reality was also evident in the higher education context, where the institutions had the need to assure the continuity of their activities remotely, without compromising the quality of the provided services (the educational and the support ones). This was a major challenge for the institutions' quality management systems (QMS), unusually designed to respond to rapid changes, especially in what concerns to an effective response to the students' needs. In the case of the Polytechnic Institute of Setúbal, the institutional response resulted from an action plan based on two major principles—the use of the existing quality's structure/instruments and its integrated reflection—in order to find improvement inputs to the system's performance. The results evinced a globally positive response but also the need to adjust the QMS to better serve the academic community's needs, particularly those of students.

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COVID-19 was declared the pandemic on 11 March 2020, and the world is still in the throes of an unprecedented and highly unpredictable public health crisis, with consequences at an individual, group, organisational, and societal level. Under such dire circumstances, leadership is of decisive importance, as the repercussions of the decisions taken may, now more than ever, be crucial. Hence, leadership is currently essential not only for the success, but for the actual survival of organisations. In a scenario of ongoing change with unforeseeable outcomes, the absence of good leadership could mean the demise of an organisation. Grounded on the theory of responsible leadership and the theory of shared leadership, the authors present the good leadership practices that are considered essential during times of major unpredictability such those currently underway.

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The COVID-19 pandemic has brought a global downturn in economic activity, with new social and economic conditions. For executive secretariat professionals, the pandemic has significantly contributed to change the way they operate, their tasks, activity, and importance in the organizations. The present investigation intends to understand the perception of the executive secretarial professionals of companies about the exercise of their profession, before and during the COVID-19 pandemic. Results obtained show that there have been significant changes in the new conditions and requirements inherent to the exercise of the profession, in terms of their competencies and responsibilities, as well in the implementation of new forms of work.

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Economics and COVID-19: A Bibliometric Analysis of the First Months of Publications 409

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This work discusses a bibliometric analysis of the papers published during 2020 about COVID-19 and three relevant economic keywords: GDP, unemployment, and innovation. Considering different outcomes, a significant diversity of journals without the focus on economic issues publishing articles discussing the economic impacts of the COVID-19 pandemic was observed. The authors have also suggested some correlated dimensions between the number of articles authored by researchers affiliated to different universities of diverse countries and the severity of the pandemic indicators observed for these spaces.

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University of Guadalajara, Mexico

This chapter aims to analyze the main factors of the production and consumption of organic products, as well as their policies and strategies. The analysis is based on the premise of the sustainable development of the production, distribution, and consumption systems of organic products that have the potential to improve the quality of life levels of producers, consumers, and society. It is concluded that the production and consumption of organic food is based on a more favorable agriculture, as well as by providing more nutritious and healthy food for consumption.

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A new prototype of a ripening chamber was proposed aiming to evaluate the application of computational fluid dynamics in the optimization of traditional cheeses ripening conditions. With the purpose of evaluating the possible impact in the production of cheese in three Portuguese regions, the potential economic benefits of the prototype were demonstrated. The proposed automation process would imply higher production efficiency, increasing sales, decreasing stock levels and a significant reduction in the consumption of water and electricity. Based on average values, it was estimated potential increases of 133 010 € in sales and an individual net present value of almost 560 000 €. In addition to the economic impact in firms, which are mostly small and medium firms, the results also contribute to an increase on the sustainable use of natural resources. However, it is important to highlight the contribution of the project in a pandemic situation to develop a better financial situation of the firms based on a higher margin of the business.

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Sunaina Gowan, Excelsia College, Australia

The purpose of this chapter is to explore the implications of COVID-19 to higher education and how universities and colleges can play a critical role in helping shape new ways for the world by adopting environmental sustainability as its academic mission. The effects of the pandemic have reached such proportions that the world may never be the same again. Even though educational institutions have been affected at different levels, there are some measures that can be undertaken to mitigate its impacts. The findings indicate the need for the integration of higher education for sustainable development. This study provides a unique and timely commentary about how coronavirus has altered in positive and negative ways higher education. It suggests that, due to its areas of influence, COVID-19 may also jeopardise the implementation of the sustainable development goals. It sends a cautious warning about the need to continue to put an emphasis on education for sustainable development, so that progress achieved to date is not endangered.

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Preface

The main aim of this book is to provide and share knowledge concerning the reinvention of world economies and businesses due to the pandemic situation caused by coronavirus (COVID-19). Some important drivers to deal with new uncertainties and opportunities caused by this situation are analyzed, namely: innovation and technology, intensive knowledge, entrepreneurship, and social, educational, and economic issues.

This book intends to provide insights about changes in business, financial markets, institutions and economies during COVID-19, as well as to provide information to entrepreneurs and managers for dealing with entrepreneurship and innovation, networks, financial issues and complementarities in order to recover their business and increase business and economic activities. Moreover, this book intends to point out possible opportunities, challenges, and risks in the processes of innovation and in the financial markets. Also, the importance of technology and intensive knowledge in promoting companies' efficiency and in helping its competitiveness are approaches developed in this book.

With a multi-disciplinary contributes from several researchers, this book provides key data for entrepreneurs and managers as well as for academics and students of master and doctoral degree.

The chapters cover several topics, such as, entrepreneurial activity dynamics, incubators, value creation, performance, tourism activity, logistic, financial literacy, financial markets, European banking sector, digital area, unemployment, leadership practices, (des)globalization, and higher education.

Below are presented the 25 chapters that constitute the handbook.

Chapter 1 presents the preliminary results of a broader research project - RE.COVER.ER. Based on a sample of 1075 tourism companies operating in Portugal, this study describes the impact of the pandemic's first wave on tourism companies and explores their resilience.

Chapter 2 pretends to broadcast the entrepreneurial activity that enhances tourism in Montijo municipality, before the health crisis and to present a reflection on the future of this activity in the Post-COVID-19.

Chapter 3 explores some frameworks for acceleration programs adjustable to academic business incubators and their incubates, attending best practices already published. In addition, it draws some possible strategies and reflections for a framework as a proposal for acceleration programs at academic business incubators.

Chapter 4 describes a research work in a real context, focusing on small industries and why they must become more digital, in order to create new and innovative business models and remain competitive in a post-COVID-19 scenario.

Chapter 5 pretends to identify the effect that the website has on socially responsible buyers and their level of satisfaction and understand if socially responsible buyers have an effect on customer satisfaction.

Preface

Chapter 6 proposes a national-level reskilling solution in Big Data to mitigate both social problems of unemployability and the shortage of data professionals in Portugal.

Chapter 7 discusses the emergence of WeChat and how it impacts the payment systems. The emergence of social payment and usage of social apps for buying and selling services and products was considered as threats to the banking industry. The usage of WeChat in China has fundamentally altered the whole digital communication landscape.

Chapter 8 aims to optimize the logistics structure of the LPR company in Portugal by utilizing the applied analytics methods. In doing so, both locations of facilities and structure of the logistics networks were considered as the target of the optimization process.

Chapter 9 analyzes the impact of EU funds on Portuguese companies, considering the companies that have benefited from European incentives under the Qualification and Internationalization Incentive System, since it is directed to financing investments in strategic areas to business success such as internationalization and innovation.

Chapter 10 is about financial literacy as an essential skill during economic crises and its particular importance in the COVID-19 pandemic that affected the global and domestic economies. While some of its aspects are beyond individual control, financial knowledge can help mitigate the economic crisis, manage income, and help people manage their respective finances.

Chapter 11 focuses on some of the most economically powerful countries and their policies to overcome pandemic-related adversities. More importantly, it gives insights on how Covid-19 is different from earlier crises in terms of its characteristics and also in terms of the uniqueness of the initiatives taken by the major economies in mitigating its impact.

Chapter 12 aims to critically analyze both the world economy and the deglobalization processes under the assumption that they are the result of a dialectical evolution of economic, financial, political and sanitary crisis.

Chapter 13 analyzes performance differences between family and non-family firms. Additionally it aims to see if economic downturns and upwards cause impact in this relation. For it, a panel data of Portuguese non-financial listed firms in Euronext Lisbon during the period from 2010 till 2019 is analyzed.

Chapter 14 intends to highlight the importance of complementing the financial analysis, based on traditional valuation measures, using value creation as an essential management control instrument.

Chapter 15 aims to analyze the impact of the global 2020 pandemic on the banking sectors of the Czech Rep, Hungary, Poland, Romania, Russia, Slovakia countries in the period from January 2, 2017 to August 10, 2020.

Chapter 16 analyzes the rebalancing of portfolios in the financial markets of China, Hong Kong, Malaysia, Singapore, Indonesia, Japan, Philippines, Thailand, South Korea, Gold (Bullion(Zurich) kg(995) CHF), Silver (Paris Spot E/KG), Platinum (Paris Spot E/KG), in the period from 2 September 2019 to 2 September 2020.

Chapter 17 aims to analyze the efficiency, in its weak form, in the exchange rates of Brazil vs. USA, Australia, Canada, Europe (Euro Zone), Switzerland, United Kingdom and Japan, from July 1, 2019 to September 20, 2020.

Chapter 18 studies the relation between markets and covid 19. All over the world, shock waves caused by of COVID-1 are felt with impacts on economies in general and the financial sector in particular. Aiming to assess the relationship between confirmed cases and deaths and the behaviour of stock markets, this chapter perform a dynamic analysis, based on the Pearson correlation coefficient, for 10 of the most affected countries in the world.

Chapter 19 refers to the case of the Polytechnic Institute of Setúbal and its institutional response do Pandemic crisis that resulted from an action plan based on two major principles: the use of the existing quality's structure/instruments and its integrated reflection, in order to find improvement inputs to the system's performance.

Chapter 20 studies leadership and its importance not only for the success, but for the actual survival of organizations. This chapter present good leadership practices that are considered essential during times of major unpredictability, such those currently underway.

Chapter 21 intends to understand the perception of the executive secretarial professionals of companies about the exercise of their profession, before and during the COVID19 pandemic.

Chapter 22 discusses a bibliometric analysis of the papers published during 2020 about Covid-19 and three relevant economic keywords: GDP, Unemployment, and Innovation.

Chapter 23 aims to analyze the main factors of the production and consumption of organic products, as well as their policies and strategies. The analysis is based on the premise of the sustainable development of the production, distribution and consumption systems of organic products that have the potential to improve the quality-of-life levels of producers, consumers and society.

Chapter 24 analyzes the economic impact in the production of traditional cheese in three Portuguese regions, of the application of computational fluid dynamics in the ripening chambers, highlighting the contribution of the project, in a pandemic situation, to develop a better financial situation of the firms, based on a higher margin of the business.

Chapter 25 explores the implications of Covid-19 to higher education and how universities and colleges can play a critical role in helping shape new ways for the world by adopting environmental sustainability as its academic mission.

These chapters present a combined overview related with a large range of topics offering a multidisciplinary perspective around the impact of Covid19 on several industries and organizations. Moreover, the book cover examples of different countries, types of firms (listed and non-listed firms, profit and non-profit organization, financial and non-financial firms, different industries), and government.

Finally, we would like to thank all authors for the participation on this book as well as reviewers who gave valuable insights to authors to improve the work's quality. We are also grateful to IGI Global staff, for their continuous support during the development of the book.

Chapter 1

COVID-19 and the Resilience of Tourism Businesses in Portugal

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ABSTRACT

The pandemic of SARS-COV-2 has significantly affected tourism, and many tourism companies have seen their revenue significantly reduced. Thus, the question arises: ‘How resilient are tourism companies to the COVID-19 pandemic (1st wave) effects on their activity?’ This chapter presents the preliminary results of a broader research project: RE.COVER. Based on a sample of 1,075 tourism companies operating in Portugal, this study describes the impact of the pandemic’s first wave on tourism companies and explores their resilience. Results reveal a high level of impact of the pandemic on tourism companies. In terms of resilience, most companies’ managers are perceived as proactive, and many companies implemented mitigation measures. Even though half of the companies could not find effective responses to the situation, there is, however, one small group of companies that seem to be more resilient, suggesting the need for more investigation on the reasons why.

INTRODUCTION

On March 11th, 2020, the World Health Organization declared the pandemic of COVID-19. The first concern of most governments and businesses was the safety of their citizens and communities. Travel restrictions and the lockdown of most non-essential businesses was the way to ensure that.

The pandemic affected several economic activities, and tourism was one of them. The decision to shut down hotels, restaurants, theme parks, and most attractions, as well as the travel ecosystem’s full

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disruptive effect, caused a considerable impact on worldwide tourism. The airline industry, too, suffered enormous losses. To give some examples, on March 5th 2020, the British airline company FlyBe was the first to succumb to market pressure, announcing bankruptcy. Soon was followed by others, like Scandinavian Airlines and Virgin.

With international air travel quickly decelerating, many countries enforcing travel prohibitions, closing borders, or introducing quarantine periods, international and domestic tourism dropped abruptly. All this had no precedent. In just a few months, the global tourism system moved from over-tourism (Dodds & Butler, 2019; Seraphin et al., 2018) to non-tourism.

All over the world, the pandemic affected all parts of the tourism value chain. The impact of cancelled events, closed accommodations, and other locked-down attractions impacted other parts of the supply chain, such as catering and laundry services. Restaurants, too, were affected. Some closed, others were able to switch to take-away/delivery sales, continuing their operations, at least partially. Layoffs and bankruptcies resulted from this situation.

In Portugal, the scenario was no different. According to the National Statistics Institute (INE), the hotel sector recorded a 63% decrease in overnight stays in 2020 (around 26 million Euros). In January of 2021, according to the Portuguese Hotel Association (AHP), 80% of hotel units were closed, and the recovery of the sector was not foreseen until 2024.

According to Banco de Portugal (BP, 2021), the Portuguese national bank, in 2020, the expectations considering the impact of Covid-19 were negative or very negative in terms of turnover associated with the reduction in orders/customers (59%) and the new virus containment measures (56%). These percentages increase to 84% and 82%, respectively, among lodging companies and restaurants. At least 50% of hotel companies and restaurants benefited from some measure offered by the Government during 2020 (BP, 2021). Most beneficiary companies consider these measures important.

Despite the difficult times tourism companies faced in 2020, some struggled to remain open and mitigate losses. COVID-19 pandemic is not the only type of disaster situation that tourism companies faced in the past, and the literature reveals that in previous situations, many companies recovered. This chapter will discuss tourism companies' resilience and how they responded to the COVID-19 situation.

Disasters and Disruptive Contexts on Tourism and Hospitality

Most definitions of disaster include disruption as the main element in their explanations, namely social disruption (Rodriguez et al., 2006). Brown et al. (2017, p.363) define disaster as: "A sudden event where the trigger is outside the current control of the affected area (community and/or business), the event disrupts the function of that area and requires additional resources (other than those available within the area) to respond to and recover from the event."

Disasters and other forms of crises (*e.g.*, epidemics, conflict, pollution) can cause a negative influence on visitation to the affected area (Bhati et al., 2016). Literature provides several empirical shreds of evidence of reductions in tourist arrivals after major disasters. For instance, Mazzocchi & Montini (2001) evaluated the impact on visitation to the Umbria region in Central Italy consequence of the earthquake in September 1997. Data revealed that arrivals fell considerably in the first month after the disaster with continuing loss in tourism activity until June 1998. Huang and Min (2002) analysed Taiwan's earthquake in September 1999, using an integrated moving average model to investigate the recovery process. Their study revealed that, after 11 months, the island's inbound arrivals had not yet fully recovered from the earthquake's devastation. Kuo et al. (2008) used a time series model to investigate the impacts of infec-

tious diseases, such as the Avian Flu and the Severe Acute Respiratory Syndrome (SARS-COV-1), on international tourist arrivals in Asia. Also, the studies of Mao et al. (2010) and McAleer et al. (2010) indicated a significant impact on international tourist arrivals in the case of SARS-COV-1.

According to Rossello, Becken, and Santana-Gallego (2020), several reasons explain why visitation to disaster areas decline after an event. Firstly, the damage caused by a disaster prevents the affected areas from participating in tourism activity. Secondly, the decline in tourist arrivals is also related to the travellers' risk perception and avoidance of regions that are considered unsafe. Thirdly, potential travellers may feel uncomfortable or have ethical concerns about travelling to a disaster region.

There is evidence of the negative effects of disasters on tourism (Brown et al., 2019; Lamanna et al., 2012; Malhotra & Venkatesh, 2009; Orchiston & Higham, 2016; Pearlman & Melnik, 2008; Singal et al., 2010). These negative effects have forced managers to think more strategically. They recognised the importance of following the rules and regulations to make their hotels more resilient to facilitate faster recovery.

However, previous recovery studies are mainly focused on localised events in space and time, such as terrorist attacks (Carlsen & Hughes, 2008; Kahan, 2015; Tingbani et al., 2019), earthquakes and tsunamis (Li et al., 2019; Lin, Wang & Liu, 2017; Robinson & Jarvie, 2008) or typhoons, storms and floods (Asgary et al., 2012; Khan & Sayem, 2013; Lam et al., 2012; Lam et al., 2015). Most of these studies are concerned with the impacts at the destination level. Rarely have they highlighted the case of tourism businesses, and if businesses are discussed, it is in the perspective of the recovery of destinations (Corbet et al., 2019; Khazaia et al., 2018). Moreover, SARS-COV-2 has completely different characteristics – namely, its global range and duration.

This lack of information and the characteristics of the COVID19 pandemic reinforce this research's need. It justifies the relevance of analysing the impact of the pandemic through the perspective of organisational resilience. Although some recent studies have been published recently (Bryce, Ring, Ashby & Wardman, 2020; Filimonau, Derqui, & Matute, 2020), the phenomenon continues to develop, justifying the need for more in-depth studies, particularly concerning organisational resilience.

Organisational Resilience

Organisational resilience is defined as an organisation's ability to absorb and adapt in a changing environment (ISO, 2017) and, according to Gonçalves et al. (2019), survive and strengthen in times of crisis. According to Ortiz-de-Mandojana and Bansal (2016), organisational resilience is related to the ability to anticipate, avoid, and adjust to disruptions and changes. This ability merges an organisation's capacity to re-establish efficacy after a disruption with the development of capabilities to respond (Burnard & Bhamra, 2011). Resilience requires the ability of the organisation to manage environmental requirements that are changing (McDonald, 2006), implies the ability to change and learn (Carpenter et al., 2001; Gallopín, 2006) and reconfigure its resources to respond to the disruption (Ambulkar et al., 2015). Organisations that adopt and continuously develop an adaptive capacity are more able to use new knowledge (Staber & Sydow, 2002). They are more prepared to operate through a larger range of variability.

Nilakant et al. (2014) argue that organisation resilience has two dimensions – planned and adaptive. Planned resilience occurs pre-disaster. Adaptive resilience typically emerges post-disaster and requires leadership, external linkages, internal collaboration, and ability to learn from past experiences, and staff well-being.

The construct of resilience has been applied to the tourism literature before (*e.g.*, Biggs, Hall, & Stoeckl, 2011; Dahles & Susilowati, 2015; Lew, 2014; Luthe & Wyss, 2014).

The literature identifies different approaches to resilience. A summary of these frameworks is presented in Table 1, where an overview of the various approaches to managing disruptive events is provided. Some deterministic approaches to building resilience suggest that when interruptions are small and involve understandable parameters, organisations can respond through positive adjustments (Sutcliffe & Vogus, 2003). When crises are bigger and more impactful, a more structured response is needed (Staw et al., 1981). According to these approaches, organisational strategies should minimise the disruption's size to make it more controllable. This approach is quite rigid and assumes that the organisation can predict risks. However, this is not always the case. Some authors even point out that rigorous crisis management plans can decrease an organisation's ability to allocate resources to the right place (Ambulkar et al., 2015). For instance, Olcott and Oliver (2014), who studied the impact of the earthquake that hit Japan in 2011, report that these unexpected and large-scale events, for which there is no dominant response model, expose vulnerabilities that may have been hidden or ignored in crisis management plans. For those authors, a softer approach can lead to flexibility and work better. This approach included a sense of obligation to suppliers, customers, employees, and the community in general and the ability to contextualise and act on the information they receive appropriately. In the presence of these favourable conditions, the probability of a positive adjustment to overcome the impacts of a rupture increases (Sutcliffe & Vogus, 2003).

Christopher and Peck (2004) studied the risk through the lens of supply chain networks. They conclude that as supply chains increase in complexity, due to the market volatility, outsourcing, globalisation and single point sourcing, the risk of disruption also increases. Networks become more vulnerable as supply chains become longer and leaner. They consider that a resilient supply chain must be adaptable in the context of today's business environment. Robust processes may not be adaptable.

Consequently, a supply chain with robust processes is not necessarily resilient. Similarly, Sheffi and Rice (2005) argue that an organisation's ability to recover from disruption can be improved by building redundancy and flexibility on its supply chain. Investment in redundancy can represent a cost increase. However, it generates additional benefits for day-to-day operations.

The OECD (2014) has a territorial approach to resilience, arguing that the available knowledge of the different risks in developing countries is accurate. Several risk analysis tools are used, giving information about where and when certain conflict, natural disasters, economic shocks, and pandemics can appear. However, there is still a lack of a shared vision on how to answer and prevent these risks. For the OECD, a resilience systems analysis can provide key actors with a (1) shared view of the risk landscape that people face; (2) an understanding of what people need for their well-being; (3) an analysis of how the risk affects the key components of the well-being system; (4) a shared understanding of power dynamics, and how the use or misuse of power can help or not people's access to the resources they need to manage with shocks; and (5) a shared vision of how to boost resilience in the system, and how to integrate these aspects into policies and develop strategies at all levels of society. Resilience systems analysis is a flexible approach that implies sharing data and expertise. That can allow different actors to develop an analysis and build roadmaps in a short time. Finally, a resilience system's analysis also helps key actors centralise and exchange information and consensus on the risks and priorities for increasing resilience. More recently, in a study applied to tourism destinations, Filimonau and Coteau (2019) conclude that local tourism stakeholders are well aware of the potential damage of natural disasters on destinations. However, they cannot develop effective measures to build organisational resilience.

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Table 1. Approaches to resilience

Approach	Contributions	Authors
Managerial mitigation	Stresses the importance of management techniques employed to reduce both exposure and vulnerability through smart business practices.	Alesch et al. (2001)
Organisational adaptability	Focus on understanding and overcoming barriers to organisational adaptability and maintaining positive adjustment under challenging conditions dependent on organisational structures and controls.	Sutcliffe and Vogus (2003)
Supply-chain resilience (SCRES)	SCRES can be created through four key principles: (1) resilience can be built into a system in advance of disruption (i.e., re-engineering), (2) a high level of collaboration is required to identify and manage risks, (3) agility is essential to react quickly to unforeseen events, and (4) the culture of risk management is a necessity. Characteristics such as agility, availability, efficiency, flexibility, redundancy, velocity, and visibility are secondary factors.	Christopher and Peck (2004)
Redundancy vs flexibility in supply chains	Improving flexibility instead of redundancy in a supply-chain context. Flexibility requires building organic capabilities that can sense threats and respond to them quickly. Resilient companies build flexibility into each of five essential supply chain elements: the supplier, conversion process, distribution channels, control systems and underlying corporate culture.	Sheffi and Rice (2005)
Supply chain resilience and the importance of balancing forces of change against management controls	A portfolio of balanced resilience depends on developing capabilities and reducing vulnerabilities. Supply chain resilience can be assessed in terms of two dimensions: vulnerabilities and capabilities. Resilience is defined as the desired balance between vulnerabilities and capabilities, where it is proposed that firms will be the most profitable in the long term.	Pettit et al. (2010)
Conceptual models' approach to organisational resilience	Practitioner focused work derived from common themes in different disciplines. Some characteristics help create organisational resilience: acuity; ambiguity tolerance; creativity and agility, stress coping; learnability. Demonstrate that resilience arises from a complex interplay of organisational elements or capabilities that contribute to resilience when adapting to a significant change.	Gibson and Tarrant (2010)
Model for crisis strategic planning	The type of resilience achieved depends on the approach to crisis strategic planning. To be resilient in times of crises, organisations need to: (1) have leaders able to inspire people with a sense of hope and direction, (2) have an organisational culture that values disciplined planning, (3) plan and make decisions carefully and structured effectively and (4) have teams able to recognise patterns and integrate information to make sense of a chaotic situation.	Vargo and Seville (2011)
Supply-Chain Resilience Framework (update)	Following Pettit et al. (2010) 's conceptual foundations, proposes a measurement instrument that helps managers implement the Supply Chain Resilience Framework. The balance between vulnerabilities and capabilities must be measured to assess the current level of resilience.	Pettit et al. (2013)
Resilience systems analysis	The approach focus on (1) adding elements that address the complexity and inter-linkages of different risks; (2) consider the uncertainty and change by exploring long-term trends; (3) merging risk forecasting with critical reflection on how the system has performed in the past; (4) focusing on the system, not the risk; and, (5) understanding the importance of power relations in helping or hindering resilience and taking into account both large scale and small scale shocks (low impact events, like illness, can also have a devastating impact on people's lives).	OECD (2014)
Framework to facilitate stakeholder collaboration	The disaster management principles should be integrated into the destination management plans to enhance tourist destinations' resilience to natural disasters. The success of such integration depends on the extent of tourism stakeholder collaboration.	Filimonau and Coteau (2019)

Source: Burnard et al. (2018), adapted and updated

At the organisational level, the model of Gibson and Tarrant (2010) considers organisational attributes (such as leadership, communication, and sensitivity) and other tangible elements of organisations such as financial capitals, skilled labours, and infrastructures, crucial for the development of resilience.

According to these authors, traditional management models can be suitable in routine and predictable social environments but are inadequate in adversity environments and crises. The authors propose a herringbone and triangle model of resilience. They advocated that organisational capabilities and a set of activities can contribute to resilience, defending a holistic alignment of all facets of the organisation's life (Figure 1).

Figure 1. The herringbone model of resilience
Source: Gibson & Tarrant (2010, p. 10)



Methodology

The study presented in this chapter has a descriptive and exploratory research design. The descriptive type of studies is appropriate when the study aims to identify characteristics, frequencies, trends, and categories. It is adequate for cases still unknown when the information and knowledge are not yet consolidated. An exploratory design is advocated for new research themes or addresses a current issue from a new perspective.

The data presented in this chapter were collected through a questionnaire survey from June to September 2020. Two other data collection phases are planned for 2021 under a longitudinal design. In this chapter, we present the results of the first phase of the RE.COVER study.

The invitation with the link to an online questionnaire was sent to the companies in a database available from Portugal's National Tourism Registry. The database includes companies from the following sectors: hotels and similar, hostels, travel agencies, tourism animation, in a total of 16.000 companies with the available email address. A convenience sample of 1.075 tourist companies that answered the question-

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naire was obtained. Tables 2 and 3 present a characterisation of the companies included in the sample, mostly small companies under a limited liability legal form, similar to the population's characteristics.

Table 2. Legal form

LEGAL FORM	FREQUENCY	PERCENTAGE
<i>n.a.</i>	9	0.8
Joint-stock corporation	71	6.6
Limited liability company	477	44.4
Limited liability company (sole proprietor)	375	34.9
Unincorporated	94	8.7
Self-employed	28	2.6
Co-op	11	1.0
Association	9	0.8
State-owned	1	0.1
Total	1075	100

Source: The authors

Table 3. Number of Employees

NO. FTE EMPLOYEES	FREQUENCY	PERCENTAGE
1 a 4	790	73.5
5 a 9	123	11.4
10 a 14	47	4.4
15 a 29	42	3.9
30 a 49	31	2.9
50 a 249	38	3.5
250 or more	4	0.4
Total	1075	100

Source: The authors

Considering our research question, '*How resilient are tourism companies to the COVID-19 pandemic (1st wave) effects on their activity?*', the variables used in the study are oriented towards two specific objectives: (1) to describe the impact of the pandemic, and (2) to explore the resilience of these companies, both planned and adaptive (Nilakant et al., 2014). Table 4 presents the variables included in the questionnaire.

Table 4. Variables in the study

SPECIFIC OBJECTIVE	VARIABLE	SOURCE	ITEM IN QUESTIONNAIRE
To describe the impact of the pandemic on tourism companies	The scale of the disaster	Alesch et al. (2001)	Company's revenue (in the previous two months) compared to the similar period in 2019
To explore the resilience of tourism companies	Planned resilience	Nilakant et al. (2014) Ha et al. (2020)	Existence of a previous contingency plan for unpredictable situations
	Adaptive resilience: <ul style="list-style-type: none"> • Characteristics of the company <ul style="list-style-type: none"> ◦ Degree of proactiveness of the manager • Activities <ul style="list-style-type: none"> ◦ Mitigation measures 	Nilakant et al. (2014) Gibson & Tarrant (2010) Alesch et al. (2001) Gibson & Tarrant (2010) Alesch et al. (2001)	How management perceives the impact of COVID19 on the industry and the company and intends to respond Measures the company has taken How the company has been able to find quick responses

Source: The authors

RESULTS AND DISCUSSION

Managers were asked to identify the loss of revenue in the two previous months, compared to 2019, to measure the disaster's scale. Table 5 shows that more than 50% of the companies had no revenue at all in the two months before the survey, and more than 38% had a decrease of revenue higher than 50% compared to 2019. Also notable is that some companies (3.6%) managed to have higher revenue than in 2019. Despite that, results suggest that the negative effects of the pandemic were very high for most companies.

Table 5. Revenue (in the previous two months) compared to the homolog period in 2019

	FREQUENCY	PERCENTAGE
No revenue	575	53.5
Decrease higher than 50%	413	38.4
Decrease of less than 50%	33	3.1
Similar revenues	15	1.4
Higher revenues	39	3.6
Total	1075	100

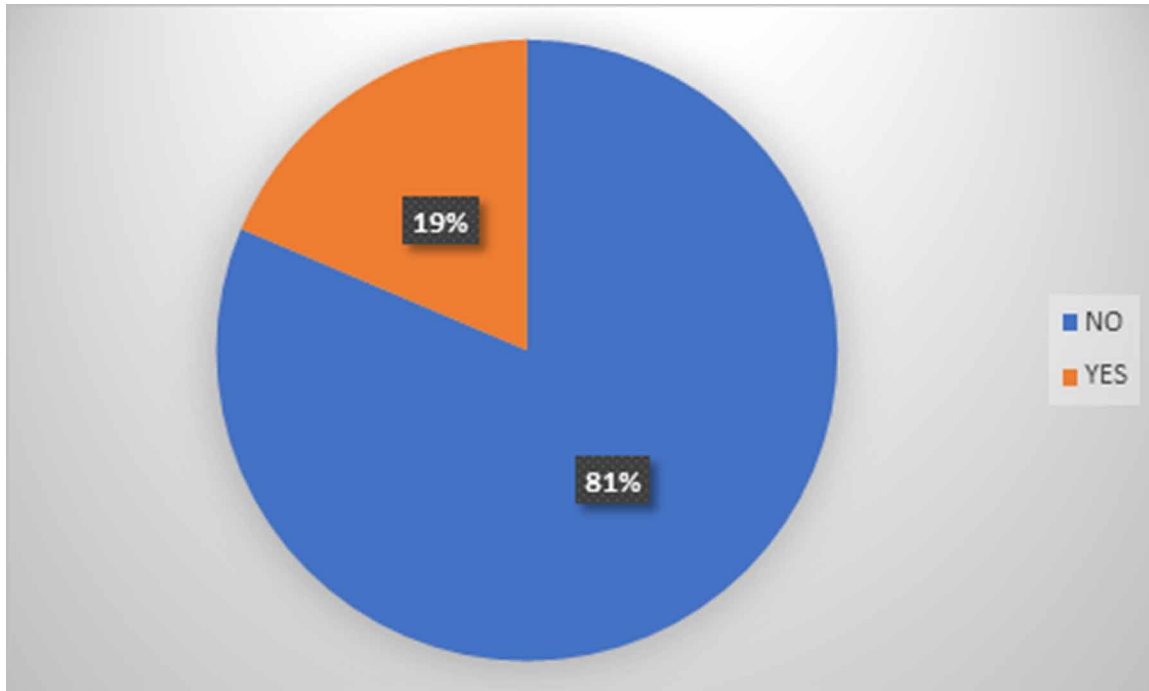
Source: The authors

To learn about the planned resilience of these companies, we asked if the company, before COVID19, had a contingency plan for unpredictable situations. Results show that a large majority of companies did not have a contingency plan, suggesting low levels of planned resilience (figure 2).

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Figure 2. Percentage of companies (not) having a contingency plan for unpredictable situations

Source: The authors



In terms of adaptative resilience, the study focused on the manager’s characteristics, namely its degree of proactiveness towards the pandemic and the companies’ actual response to the situation. Table 6 shows the results regarding the proactiveness of managers. Less proactive managers (score of 1) recognise that the industry will undergo lasting changes but consider that no change to its business model will significantly differ. The more proactive managers (score of 4) are those that, despite considering that the situation in their industry will return to normal (sooner or later), will still change some aspects of the company’s business model to deal with the impact of the pandemic.

Results show that most managers (74.2%) are proactive and therefore consider changes in the company’s business model, even before knowing how the pandemic will develop. Noticeable, there is also a significant proportion of managers who are not proactive (19.1%).

Table 6. Degree of proactiveness of the manager

	FREQUENCY	PERCENTAGE
1 (Less)	205	19.1
2	72	6.7
3	532	49.5
4 (More)	266	24.7
Total	1075	100

Source: The authors

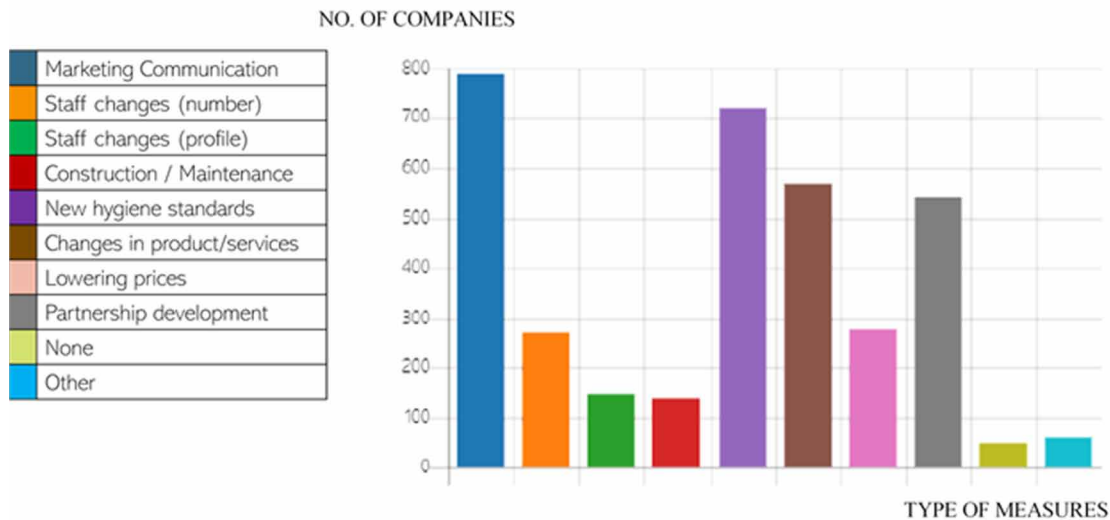
Respondents were asked to identify the specific measures taken by their companies to explore tourism companies' resilience. Figure 3 presents the most common managerial mitigation measures taken. Marketing communication measures were the most common practice (789 companies; 73.4%). Therefore, many companies developed some marketing actions to keep in touch with their usual markets or to reach new markets, namely the internal market which was the one where travelling restrictions were expected to be lifted earlier.

Another measure taken by many companies was implementing new hygiene standards (720 companies; 67%). In most cases, this measure consisted of acquiring the "Clean & Safe" seal. This seal, launched by Turismo de Portugal, recognises "companies and leisure activities compliant with health safety recommendations issued by the National Tourist Authority, according to National Health Authority guidelines to avoid risks of contagion of covid-19."¹

The third most common measure is related to changes in the product/services offered (568 companies; 52.8%). This measure included either the reduction of services offered for cost control purposes or the addition of new services to attract new markets (e.g., hotels renting rooms for digital nomads and people in telework).

Figure 3. Managerial Mitigation Actions

Source: The authors



Other common measures included the development of new partnerships and the adjustment of the price (lowering). One should also notice the relatively low number of companies that reduced the number of employees (270 companies; 25.1%). Companies tended to maintain their staff, most probably as a consequence of the Government's layoff opportunities.

Regarding the effectiveness of companies' response to the pandemic's consequences, managers were asked how they agreed with the statement that the company could find ways to respond to the negative

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impact of COVID-19. Table 7 shows that half of the respondents (50.7%) disagree with that statement, and only 21%, agree or completely agree.

Table 7. The company found quick responses to the negative impact of COVID-19

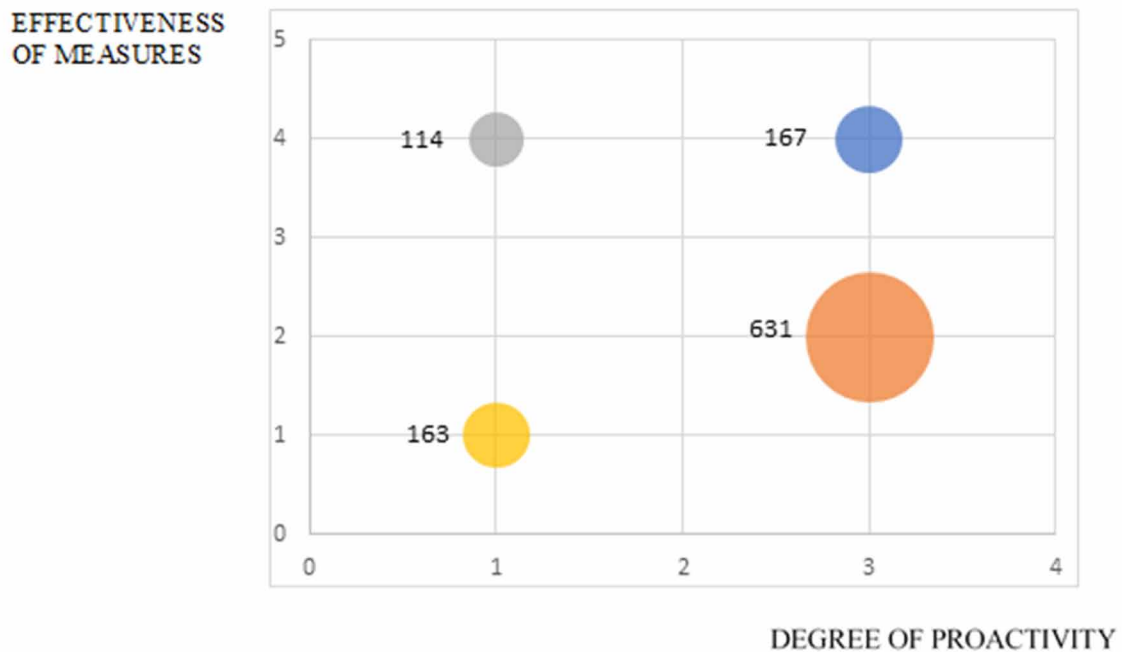
	FREQUENCY	PERCENTAGE
1 – Totally disagree	272	25,3
2	273	25,4
3	304	28,3
4	159	14,8
5 – Completely agree	67	6,2
Total	1075	100

Source: The authors

Further exploration of data reveals four clusters of companies when considering the variables ‘proactiveness of managers’ and effectiveness of the mitigation actions’ (figure 4).

Figure 4. Proactivity x Effectiveness (Clusters of companies)

Source: The authors



The largest cluster (631 companies; 58.7%) refers to companies where managers have high proactiveness levels, but the measures taken are considered to have low effectiveness. However, two clusters (one of 167 companies and another of 114 companies) recognise the measures' success and seem more resilient. Although companies with more proactive managers seem to do better than those with less proactive managers, at least at lower levels of effectiveness, data suggests that other variables might be at stake to explain better resilience, which will be investigated in the subsequent phases of the project RECOVER.

CONCLUSIONS

Tourist companies are mostly SMEs. Even in favourable business contexts, SMEs develop their activity at the limit of profitability and financial health. Therefore, these businesses and the associated employment are at particular risk due to the COVID-19 pandemic and studies are needed on how recovery could happen.

Usually, recovery studies focus on localised events in space and time, such as terrorist attacks, earthquakes, tsunamis, typhoons, storms and floods. Never has the tourism activity experienced such a global and prolonged event since World War II. Moreover, previous studies on disaster situations rarely highlight tourism businesses' case since most studies approach the event from the destinations' recovery perspective.

Concerning extreme events affecting businesses, conventional wisdom suggests that failure is a function of direct and indirect losses the company suffered. However, previous studies concerned with the consequences of natural disasters for businesses suggest that there might be other variables relevant to explaining why some companies recover and others fail.

Based on a sample of 1075 tourism companies operating in Portugal, we analysed the impact of the pandemic's first wave and these companies' resilience in this chapter.

As expected, results reveal a high level of negative impacts of the pandemic on tourism companies. In our sample, most companies did not have revenues in the two months preceding the survey.

In what concerns resilience, most of the managers of these companies are perceived as proactive, and the large majority of companies implemented some mitigation measures. The managerial mitigation actions that are more common are: marketing communication actions, implementation of stricter hygiene procedures, change in product/services and, partnership development.

Despite the measures taken, half the respondents (50.7%) state that the company cannot find quick responses to the situation, suggesting high levels of unsuccess of the measures taken. However, one group of companies (15%) seem to be more resilient, both in terms of the degree of proactiveness of managers and the effectiveness of managerial mitigation actions.

One year after the WHO's declaration of a pandemic, Europe is severely affected by its third wave. There is a realisation that recovery will take longer than expected in 2020. Despite that, there is a general perception that market recovery will start in 2021, although depending on the vaccination plan's success. The future will reveal how resilient companies will be after the pandemic. An organisation's ability, to adapt and change, predicts a business's ability to survive post-disaster. Hence, recovery does not mean returning to the state that the system was in before the event (Paton & Hill, 2006). Recovery can mean moving to a viable new system state.

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ENDNOTE

- ¹ Turismo de Portugal (portugalcleanandsafe.com)

Chapter 2

Entrepreneurial Activity Dynamics That Enhance Tourism in Montijo Municipality: Before and After COVID-19

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ABSTRACT

Montijo municipality is in Setúbal district and belongs to Lisbon metropolitan area. Many new projects have emerged in the county related to tourism. However, the health crisis that plagued the world in early 2020 raised several concerns about the entrepreneurial activity of this municipality. Thus, this study has as main objective to broadcast the entrepreneurial activity that enhances tourism in Montijo municipality, before the health crisis and to present a reflection on the future of this activity in the post-COVID-19 era. It was possible to verify that the county has a set of positive indicators with regard to tourism activity and is one of the most dynamic at national level in terms of entrepreneurship. Besides that, the implementation of new business models, new products and services, new distribution and marketing forms, based on information and communication technologies can be very important to disseminate the region and to add value to the tourist experience and business, contributing to making the region a national reference of economic and social progress.

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INTRODUCTION

Montijo's transformation has been visible in the last eight years and that can be perceived through developed partnership between Setúbal Polytechnic Business School team, and the Montijo City Council, with regard to the updating of the Strategic Plan for the Development of Tourism in Montijo municipality.

Despite the economic and financial crisis that has overwhelmed the country in recent years, many new projects have emerged in the county, notably in terms of housing, catering and infrastructure. The new Lisbon airport project, in the county, has also contributed to increase regional investment attractiveness.

However, the health crisis that plagued the world and especially Portugal in early 2020, raised several concerns about the entrepreneurial activity of this municipality, which led to this chapter.

Thus, this study has as main objective to broadcast the entrepreneurial activity that enhances tourism in Montijo municipality before the health crisis of Covid19 and to present a reflection on the future of this activity in the Post-Covid19.

Theoretical Framework - Entrepreneurship: the Silent Revolution

The existing literature on the creation of new businesses (Memili et al. 2015; Morris et al. 2015) proposes that entrepreneurship, or the process of identifying and exploiting opportunities, contributes to nations' economic growth. In fact, several authors justify the entrepreneurship relevance in recent years by today's economy growing dynamism and evolution (Audretsch et al. 2015; Acs et al.2012; Memili et al. 2015).

Timmons, in 1990, already stated that entrepreneurship in the 21st century would be a silent revolution, but more remarkable than the industrial revolution of the 20th century. In fact, and according to Schwab (2016), a new era of radical changes in industrial production and advances in robotics, nanotechnology, biotechnology, information technologies and artificial intelligence, has enabled development in the most diverse sectors. From the financial sector to health or tourism, among many other. Industry 4.0 has contributed to the emergence of new forms of mobility, marketing, communication and, consequently, new business models.

This quick change in industry has been further pressured by the health crisis caused by Covid19, forcing entrepreneurs to rapidly adapt to new working forms and business models.

In fact, this deep revolution, which affects current and future generations, has transformed economic, political, social, and environmental systems and seems to have reinforced the importance of the interaction of *various stakeholders* in systems that enhance entrepreneurial activity, by linking different actors and providing their collective development in the value creation chain.

The concept of entrepreneurial activity enhanced by a set of interconnected elements forming an active system, which allows greater dynamics and stimulus to companies' creation is not new (Neck et al., 2004; Cohen, 2006; Isenberg, 2011; Nadrodkiewicz, 2014, Costa et al. 2018), but the existence of these entrepreneurial systems remains relevant and very present in the literature.

According to Costa et al. (2018) it is possible to find in the literature several definitions related to entrepreneurial system. A few authors organized these definitions by distinguishing them between specific (Neck et al., 2004; West & Bamford, 2005; Cohen, 2006) and holistic (Isenberg, 2011; Autio et al., 2014).

Isenberg's perspective also remains very current (2011), emphasizing the need for the functioning of this holistic system, but proposing a range of actions, namely: adequacy to local conditions, private sector private sector, high potential projects' support, development of an entrepreneurial, proactive, and

resilient culture, promotion of companies' concentration and interconnection, partners' specialization, and creation of an appropriate legal and regulatory framework.

In this sense, the work developed on updating the Strategic Plan for the Development of Tourism in Montijo municipality aimed at defining various actions to strengthen economic activity, by relating different points of view and different stakeholders competences, all coordinated with the territory historical, cultural and natural heritage, thus contributing to a more favorable regional entrepreneurial system, in a way that enhances the region singularities and the emergence of projects with greater business success potential.

Methodology

The research methodology consisted of a case study of the tourism sector entrepreneurial activity in Montijo municipality, sought to address the different actors of regional entrepreneurial ecosystem, to have an overview of its recent developments, its main characteristics and main challenges caused by the pandemic situation.

The necessary information for this study was collected through *focus groups* and interviews, carried out with Montijo City Hall technicians and with *stakeholders* involved in the entrepreneurial activity of the county.

Focus groups were organized in the municipality premises, brought together different entities involved in its economic and social context, giving the opportunity to bring together diverse and unique views on entrepreneurial activity at tourism level in the region. The interviews were conducted on four dates and focused on entities with very diverse activities and representative of the region public and private business activity, namely:

- Parish council of Sarilhos Grandes;
- Quinta das Riscas (event space);
- Parish council of Canha;
- Quinta da Saudade (local accommodation);
- Monte dos Girassóis (cottages);
- Parish council of Pegões;
- Company producing Real Gin;
- Parish council of Atalaia / Alto Estanqueiro.

Pordata and the National Statistical Institute were also used to collect necessary statistical data to characterize the municipality entrepreneurial activity.

STUDY OF THE ENTREPRENEURIAL ACTIVITY DYNAMICS ENHANCING TOURISM IN THE MONTIJO MUNICIPALITY

Socio-Economic Framework of Montijo Municipality

Montijo municipality is in Setúbal district and belongs to Lisbon metropolitan area. It has been connected through the Vasco da Gama bridge to the other bank of the Tagus River since 1998, which has

Entrepreneurial Activity Dynamics That Enhance Tourism in Montijo Municipality

contributed over the last 20 years to significant changes in the demographic, social, urban, and economic structure, being, nowadays, one of the reference cities to accommodate the Lisbon metropolitan area working population.

In geographical terms, the municipality is divided into two parts: west part – consisting of the parishes: Montijo and Afonsoeiro, Sarilhos Grandes, Atalaia and Alto Estanqueiro - Jardim, with an approximate area of 56.8 km²; east part – constituted by the parishes: Union of the Parishes of Pegões and Canha with an approximate area of 287.5 km². It is also worth mentioning the high concentration of the population in the Western part, which although geographically quite lower, concentrates more than 89% of the inhabitants of the municipality.

According to information from the National Statistical Institute, in demographic terms, the municipality holds one of the youngest populations in the country, representing the working population about 50% of the total inhabitants of the territory. In addition, skilled workers with degrees account for about 30% of the workforce.

At the economic level, the municipality is characterized by having some activities of great tradition and specialization, such as the cork industry, the food industry with origin in pork and floriculture, being even considered Portugal flower capital. In addition, there is also a cultural uniqueness that is reflected in a rich and diverse gastronomy and a winery of reference at national level, with several restaurants occupying the *most prestigious rankings* of the region and the largest winery in the country. At the same time, the municipality presents a territory conducive to nature and adventure tourism, since the western part is characterized by the proximity to the Tagus River, inviting to nautical activities and riverside sports, and the East part has one of the lowest population densities in the country, and there are very attractive conditions for equestrian sports, for example.

However, despite the latent potential, the municipality continues to have an image associated with an attractive territory only as a dormitory to support the city of Lisbon.

Below is a synthesis, organized in strengths and weaknesses of the territory, based on obtained results from *focus groups* and interviews conducted with different regional business activity stakeholders, to study entrepreneurial activity dynamics that enhances tourism in Montijo municipality, both in regional and national terms.

Finally, a socio-economic characterization of Montijo municipality will also be presented, considering the available national statistics and similar information of the neighboring municipalities with similar characteristics and the cities of Lisbon and Setúbal, which represent the largest urban references in the region.

RESULTS FROM INFORMATION STEMMING FROM THE FOCUS GROUPS AND ADDITIONAL INTERVIEWS

Collecting this information has made it possible to diagnose strengths and weaknesses with regard to the economic structure and business, as well as the most important cultural and social aspects.

Strengths and Weaknesses - Economic Structure and Business

Strengths

Entrepreneurial Activity Dynamics That Enhance Tourism in Montijo Municipality

- Industrialization in sectors related to traditional products with local potential, namely delicatessen, wines, and cork.
- Specialization in floriculture activity, that made the county the largest national flower producer and that can contribute to a brand image creation and greater notoriety.
- Good conditions for agricultural development and for the growth of nature and adventure tourism, especially in the eastern part of the county.
- Location by the river with potential use of its resources that can enhance tourism, respectively, nautical and leisure activities, river transport and river walks, monuments, traditions, and all related traditional activities, arts, and crafts.
- Tourism support services development potential (catering, sports and cultural activities, commerce, animation, etc.) to take advantage of the gastronomic richness based on traditional natural products associated with the river or meat industries.
- Easy accessibility to Lisbon, both by road and river, which may contribute to a tourism increase coming from the capital.
- Professional school that can contribute to human resources qualification in the various tourism associated activities.
- Availability of revolving properties in various central areas of the city, for installation of establishments or anchor activities that attract visitors.

Weaknesses

- Lack of sufficient quality accommodation to support tourism short-term growth in the county.
- Economic activities diversification limitations.
- Negative image impact industries, in particular sour farming, meat processing and feed manufacturing industries.
- Agricultural sector financial difficulties and closure of some more traditional industries.
- Aged trade and proximity services in the county's main parish, affected by urban degradation as well as old buildings, and competition from a large commercial area.
- Low-skilled undynamic and unmotivated business actors, evidencing financial resources' scarcity that disallow focus on modernization and requalification, reducing complementary partnerships opportunities.
- Framing in the Lisbon Metropolitan Area, which greatly limits the access to Community funds and conditions economic vitality,
- Unfavorable location of the river pier and consequent reduction of activity in the city center.
- Need for better urban planning to revitalize the old town and riverside area, creating more attractive public spaces and avoiding population movements to neighboring municipalities.

Strengths and Weaknesses - Cultural and Social Aspects

Strengths

- Young population (Montijo is one of the Portuguese municipalities with the highest weight of young people in the resident population) which could contribute to skilled entrepreneurship and creative industries dynamization.

Entrepreneurial Activity Dynamics That Enhance Tourism in Montijo Municipality

- Population hospitability.
- Diverse set of local traditions (such as gastronomy) linked to the river and rurality.
- Preservation of rural identity and connection to wine and agricultural activities.

Weaknesses

- Non-existence of the brand “Montijo”, widespread ignorance of the city’s history, image very associated with “dirty” industries as is the case of pig farming.
- Diverse and regular cultural programming, but ineffectiveness in county’s attractiveness transmission.
- Some building degradation and limitations on their habitability conditions.
- Some social districts with integration problems and social risk.
- Difficulty in accessibility within the county, especially of connection between the parishes of the East and West.
- Reduced regularity of public transports to Lisbon.
- East zone parishes population isolation, limiting access to the set of services offered in the urban hub (health, sport, leisure).

Results of Statistical Information Collection

As mentioned above, in this work will be presented and analyzed various indicators, to study Montijo municipality in regional and national terms, considering the available information of a set of counties with similar endogenous characteristics, both at the level of rurality present in the eastern part of the municipality, as well as at the level of the urban environment, more associated with the western part of Montijo. So specifically, this study studied the follow municipalities: Alcochete, Moita, Palmela and Coruche, the district’s capital (Setúbal), the country’s capital (Lisbon) and the national average. This comparative analysis will allow the position of the municipality in relation to territories with similar characteristics and in relation to the country.

For the analyzed municipalities, it can be observed large disparities in tourism indicators.

As can be seen in table 1, here below, looking at some of the main tourism indicators, Montijo municipality presents five lower values when compared to Lisbon municipality. However, it shows better values in relation to occupancy rate and seasonality, which highlights the opportunity for greater sustainable growth.

Montijo municipality presents a higher housing capacity than the municipalities of Coruche, Moita and Alcochete, but inferior to that of the municipalities of Setúbal and Palmela.

As for the bed-occupancy rate, Montijo municipality grants a much higher value (65,6%) to that recorded in most of the other municipalities (only Lisbon has a value in the order of 61%). Crossing this information with the value of the average stay verified, which is in 1 night and is the lowest value of the municipalities analyzed, it can be suggested that the municipality has stated itself as an attractive area of passage for people visiting Lisbon, the south bank, and the country.

It should also be noted that, as for accommodation capacity, in addition to the establishments registered as being tourism, there has been a large increase in the number of local accommodations (AL). According to the data of Turismo de Portugal, there are currently 43 establishments registered with this

Entrepreneurial Activity Dynamics That Enhance Tourism in Montijo Municipality

activity in Montijo. The neighboring municipalities Setúbal and Palmela lead in this indicator with 488 and 127 establishments, respectively. Alcochete has 32 and Moita 18.

Last, it turns out that Montijo municipality shows, alongside Coruche (Moita has no tourists record), the lowest proportion of foreign guests compared to other analyzed municipalities.

Table 1. Tourism indicators

Territories	Accommodation capacity (number of beds) - 2017	Weight of the number of beds in hotels compared to the total - 2017	No. of tourist establishments - 2017	Weight of the number of hotels compared to the total - 2017	Average stay (number of nights) - 2017	Proportion of overnight stays between July and September (% compared to total) - 2017	Proportion of foreign guests (% compared to the total) - 2017	Occupancy rate (%) - 2017
Lisboa	55 598	74,54%	497	37,22%	1,90	30,1%	77,9%	61,9%
Alcochete	139	0,00%	4	25,00%	1,80	31,3%	32,9%	41,8%
Moita	0	0,00%	0	0,00%	0,00	0,0%	0,0%	0,0%
Montijo	502	59,16%	7	42,86%	1,10	27,0%	28,0%	65,6%
Palmela	1 802	0,00%	13	15,38%	2,00	38,1%	49,2%	15,8%
Setúbal	2 304	82,77%	29	41,38%	1,70	39,4%	38,7%	37,2%
Coruche	106	0,00%	5	0,00%	2,00	34,6%	7,0%	24,5%
Positioning against the Lisbon average	↓	↓	↓	↑	↓	↑	↓	↑
Positioning against neighboring counties	-	↑	-	↑	↓	↑	↓	↑

Source: Pordata – Statistics on overnight stays and foreign guests updated by county (2020)

At entrepreneurship level, Montijo municipality is one of the most active at national level.

In 2018, it was ranked 7th in national ranking in terms of companies' establishment in all sectors of economic activity, presenting a value of 19%.

The following is a table (table 2) and a chart (figure 1) where you can see the evolution from 2009 to 2018 of new companies in Montijo, as well as the figures for neighboring municipalities.

Table 2. Business establishment rate

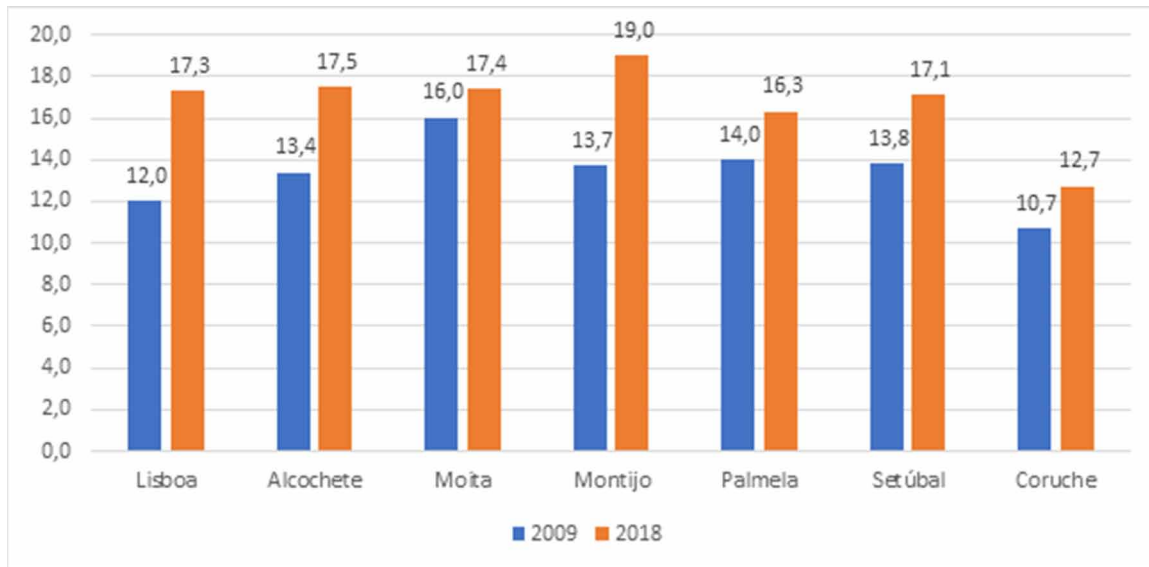
Municipalities	Sectors of economic activity							
	Total		Agriculture and Fisheries		Industries, Construction and Energy		Services	
	2009	2018	2009	2018	2009	2018	2009	2018
Lisbon	12.0	17.3	8.6	15.7	8.6	13.1	12.2	17.5
Alcochete	13.4	17.5	6.3	14.6	7.4	9.0	14.7	18.7
Moita	16.0	17.4	4.5	10.1	14.1	13.7	16.7	18.2
Montijo	13.7	19.0	4.5	10.2	10.9	14.9	14.9	20.1
Palmela	14.0	16.3	8.3	11.4	8.3	13.4	15.7	17.5
Setúbal	13.8	17.1	6.7	12.9	9.4	17.1	14.6	17.3
Coruche	10.7	12.7	9.0	14.5	7.2	9.6	12.0	12.4

Source: Pordata – Statistics on business establishment updated by county (2020)

Entrepreneurial Activity Dynamics That Enhance Tourism in Montijo Municipality

Figure 1. Business establishment rate

Source: Pordata – Statistics on business establishment updated by county (2020)



Scrutinizing figure 1, Montijo has the best company's establishment in 2018, surpassing Lisbon by almost 2 percentage points and in 6.3% the neighboring county with the worst result (Coruche). Finding, also, that the evolution of Montijo municipality from 2009 to 2018 was quite positive since it increased company's establishment from 13.7% to 19%.

Analysing company's establishment rates by activity sector (figure 2), it is found that in agriculture and fisheries, Lisbon, Coruche and Setúbal are the municipalities with the best values. Montijo is, along with Moita, one of the municipalities with the worst results in this activity.

Regarding the establishment rate in industry (figure 3), construction and energy, the municipalities that show the greatest dynamics are Lisbon, Alcochete and Coruche. Montijo is in the last position in this activity sector.

At last, in relation to services (figure 4), Montijo municipality leads, with an establishment rate above 20%, surpassing even Lisbon, which has a value of 17.5%. The municipalities that come next with the best results are Alcochete and Moita, with rates greater than 18%.

Examining data about established companies (table 3 and figure 5), results show that the municipalities of Lisbon and Setúbal are those that hold the highest numbers, namely, 19.991 e 2.170, respectively. Montijo comes in 4th place in this ranking, very close to Palmela.

However, it is noteworthy that, in terms of the growth rate of business creation, Montijo has a value of more than 20%, being just surpassed by Lisbon municipality. In addition, it is observed that it is the services sector that has the highest number of companies.

Now evaluating data by industry, in agriculture and fisheries (figure 6), the municipalities with the highest number of companies are Lisbon, Palmela and Coruche, Montijo being one of the 3 worst municipalities in this register.

Entrepreneurial Activity Dynamics That Enhance Tourism in Montijo Municipality

Figure 2. Agriculture and fisheries business establishment rate

Source: Pordata – Statistics on business establishment rate updated by county (2020)

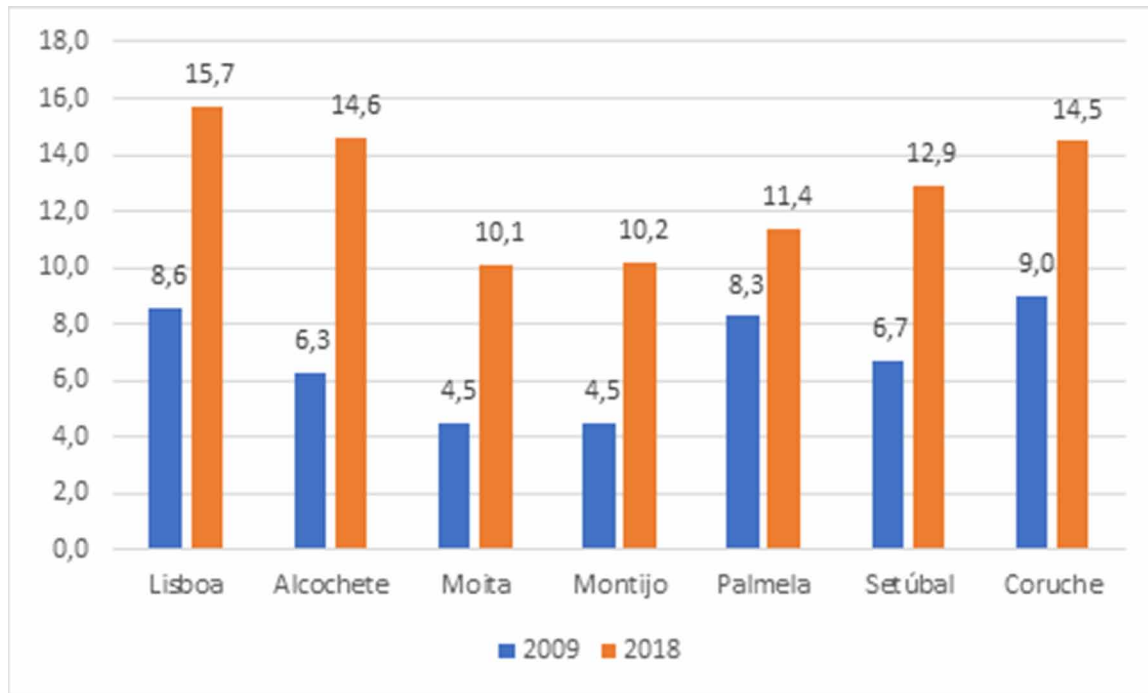
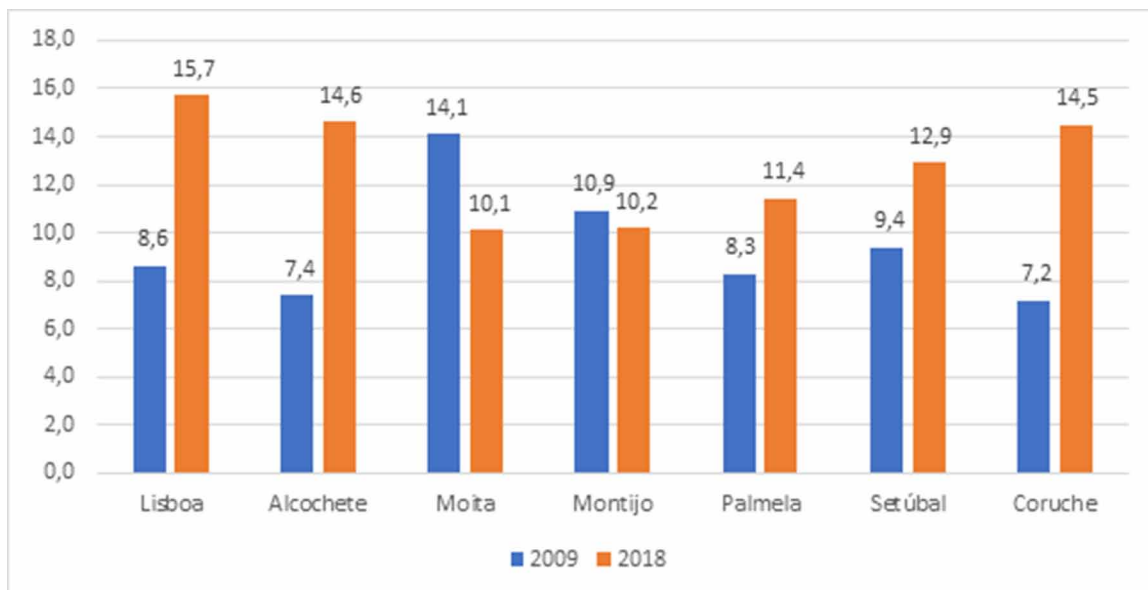


Figure 3. Industry, construction and energy business establishment rate

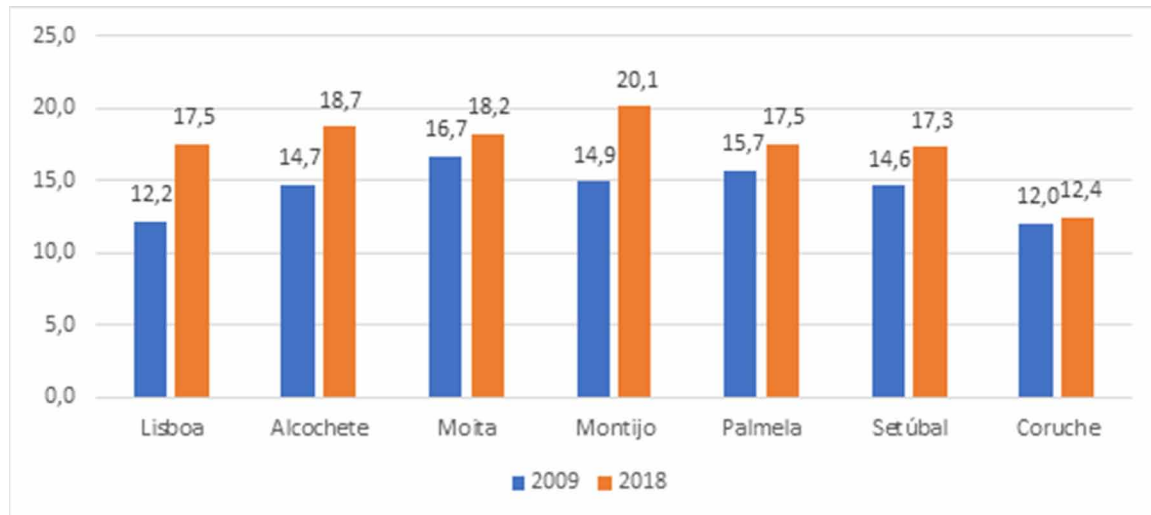
Source: Pordata – Statistics on business establishment rate updated by county (2020)



Entrepreneurial Activity Dynamics That Enhance Tourism in Montijo Municipality

Figure 4. Services establishment rate

Source: Pordata – Statistics on business establishment rate updated by county (2020)



For industry, construction and energy (figure 7), Lisbon, Setúbal and Palmela are the municipalities with the best results. Montijo municipality, besides being one of those with the worst record, also shows a decrease in the number of companies in these activity sectors.

Finally, about services activity sector (figure 8), Montijo comes in 3rd in the ranking, just behind Lisbon and Setúbal, featuring 960 companies created in 2018.

Nevertheless, beyond the dynamics of business creation, it is also important to analyze the financial sustainability potential of the companies in each activity sector, by county.

In this sense, we have also studied statistics on the subsistence rate of businesses, to determine the percentage that remained active after 2 full years of operation.

Table 3. Number of established companies

Municipalities	Economic activity sector							
	Total		Agriculture and Fisheries		Industries, Construction and Energy		Services	
	2009	2018	2009	2018	2009	2018	2009	2018
Lisbon	12 668	19 991	99	335	627	767	11 942	18 889
Alcochete	245	327	6	15	16	17	223	295
Moita	834	806	5	14	122	69	707	723
Montijo	768	1 075	16	39	80	76	672	960
Palmela	907	1 107	38	91	87	103	782	913
Setúbal	1 829	2 170	27	66	143	197	1 659	1 907
Coruche	220	240	42	76	20	19	158	145

Source: Pordata – Statistics on number of established business updated by county (2020)

Entrepreneurial Activity Dynamics That Enhance Tourism in Montijo Municipality

Figure 5. Number of established companies

Source: Pordata – Statistics on number of established business updated by county (2020)

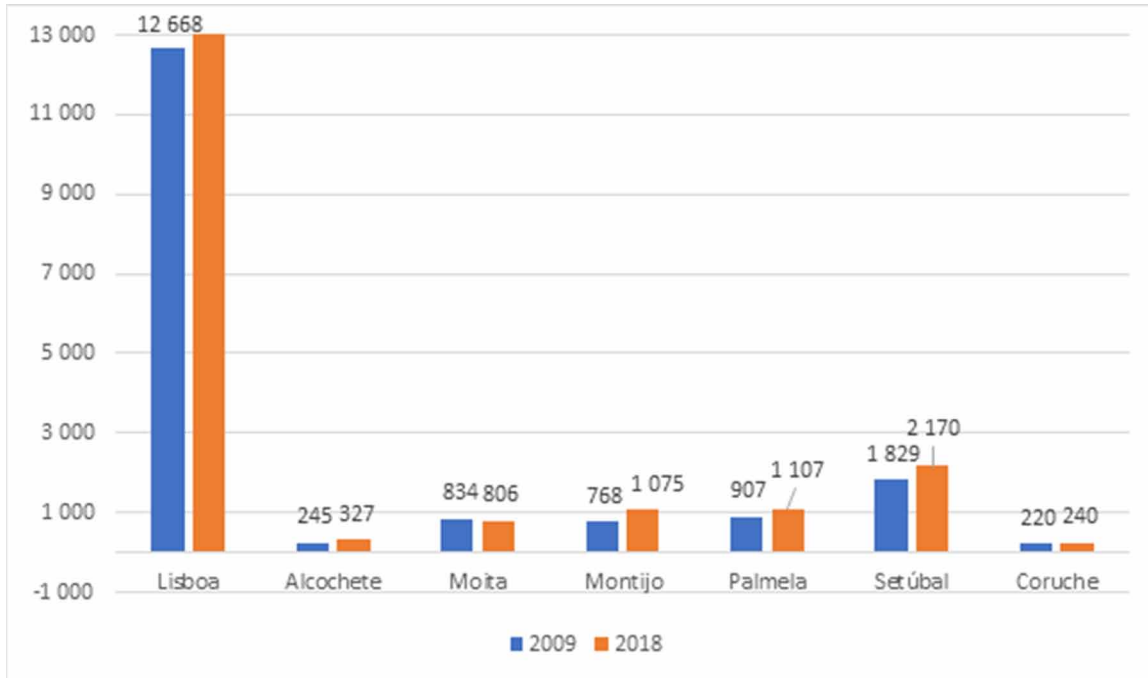
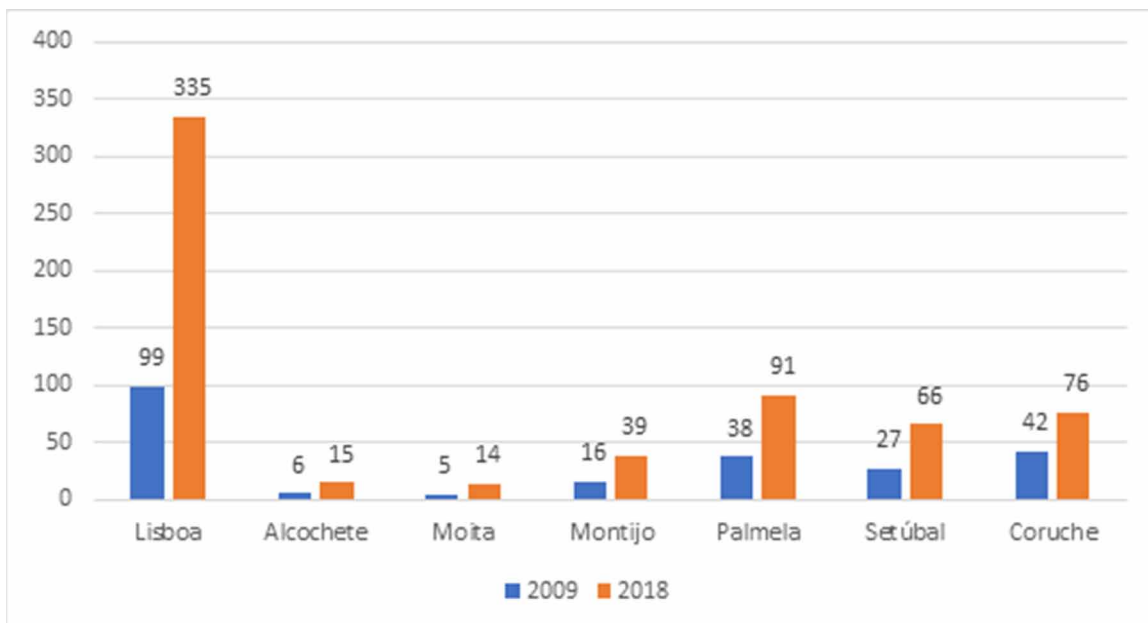


Figure 6. Number of established companies in agriculture and fisheries

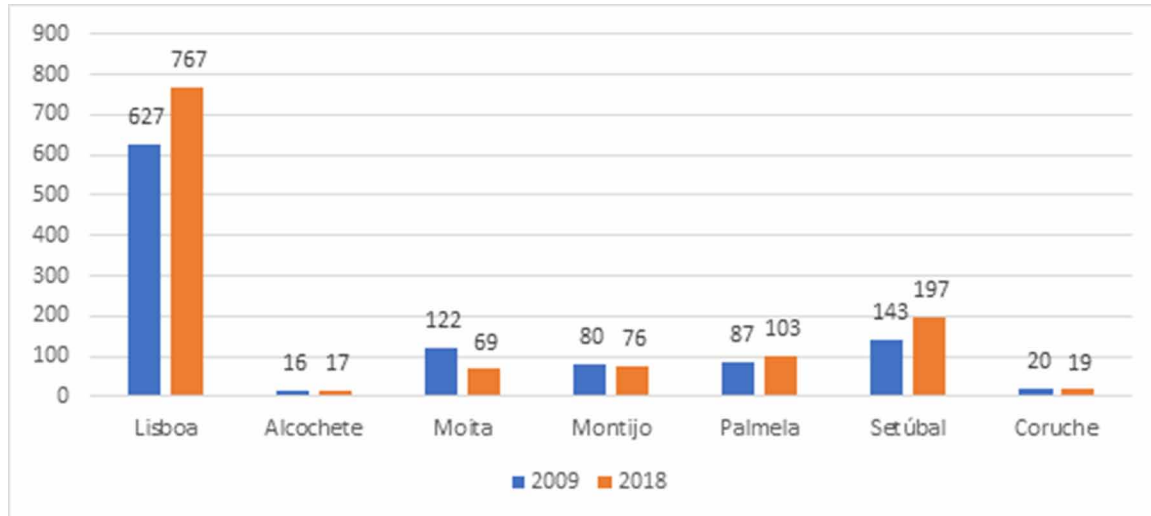
Source: Pordata – Statistics on number of established business updated by county (2020)



Entrepreneurial Activity Dynamics That Enhance Tourism in Montijo Municipality

Figure 7. Number of established companies in industry, construction and energy

Source: Pordata – Statistics on number of established business updated by county (2020)

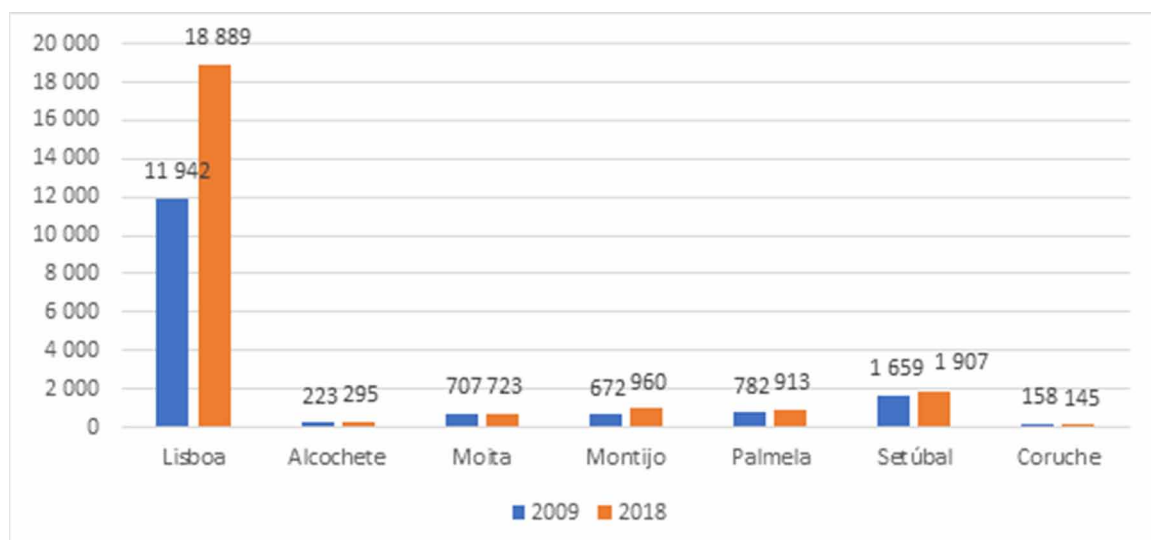


Below, table 4 and figure 9 present the figures for companies' subsistence rate in the municipalities under study, based on 2018 records.

For the overall values of companies' subsistence rate, Montijo, with a value of 71.9%, is one of the three municipalities with the best values in this indicator, being only surpassed by the municipalities of Lisbon and Alcochete, with 72.1% and 74.2%, respectively.

Figure 8. Number of established companies in services

Source: Pordata – Statistics on number of established business updated by county (2020)



Entrepreneurial Activity Dynamics That Enhance Tourism in Montijo Municipality

Table 4. Business subsistence rate

	Economic activity sector			
	Total	Agriculture and Fisheries	Industries, Construction and Energy	Services
Municipalities	2018	2018	2018	2018
Lisbon	72.1	66.0	79.6	72.0
Alcochete	74.2	75.0	84.2	73.6
Moita	68.2	50.0	78.6	67.9
Montijo	71.9	60.6	81.7	71.5
Palmela	70.7	68.2	73.6	70.7
Setúbal	69.4	60.2	78.7	69.0
Coruche	67.6	53.6	52.9	74.8

Source: Pordata – Subsistence rate statistics, updated by county (2020)

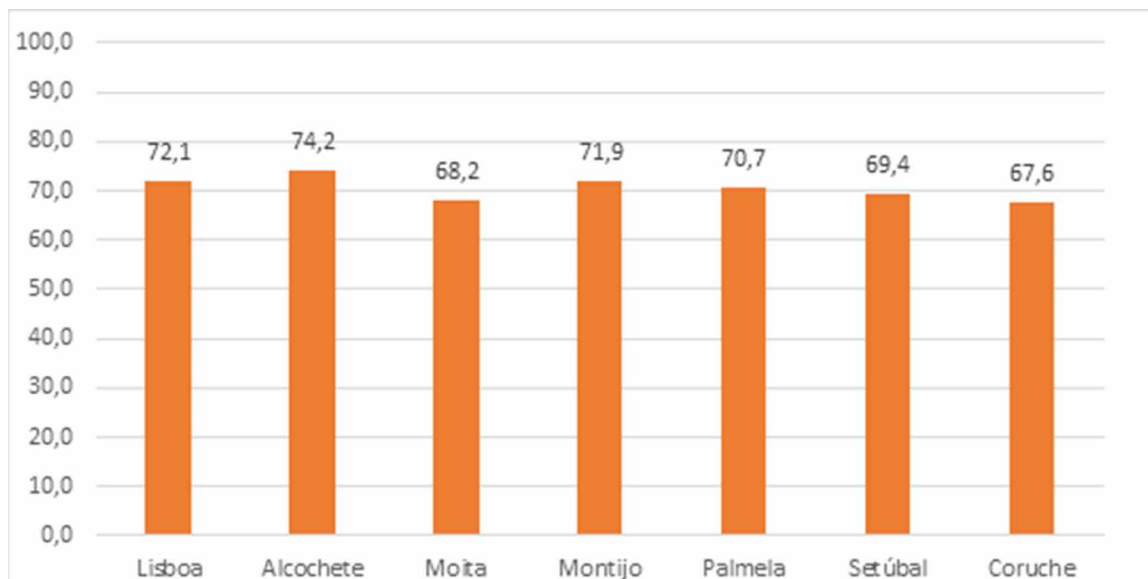
About the analysis by activity sector, in the case of agriculture and fisheries (figure 10), the municipalities with the most success in retaining operating companies operating are located in Alcochete and Palmela. Montijo, in this sector, with a value of 60.6%.

As for industry, construction, and energy (figure 11), the counties with the best results are Alcochete and Montijo, with business survival rates above 80%.

Finally, about the services sector (figure 12), the municipalities with the best results are Coruche, Alcochete and Lisbon with persistence rates of 74.8%, 73.6% and 72%, respectively. Montijo has a value of 71.5%.

Figure 9. Business subsistence rate

Source: Pordata – Subsistence rate statistics, updated by county (2020)



Entrepreneurial Activity Dynamics That Enhance Tourism in Montijo Municipality

Figure 10. Survival rate of agriculture and fisheries' companies

Source: Pordata – Subsistence rate statistics, updated by county (2020)

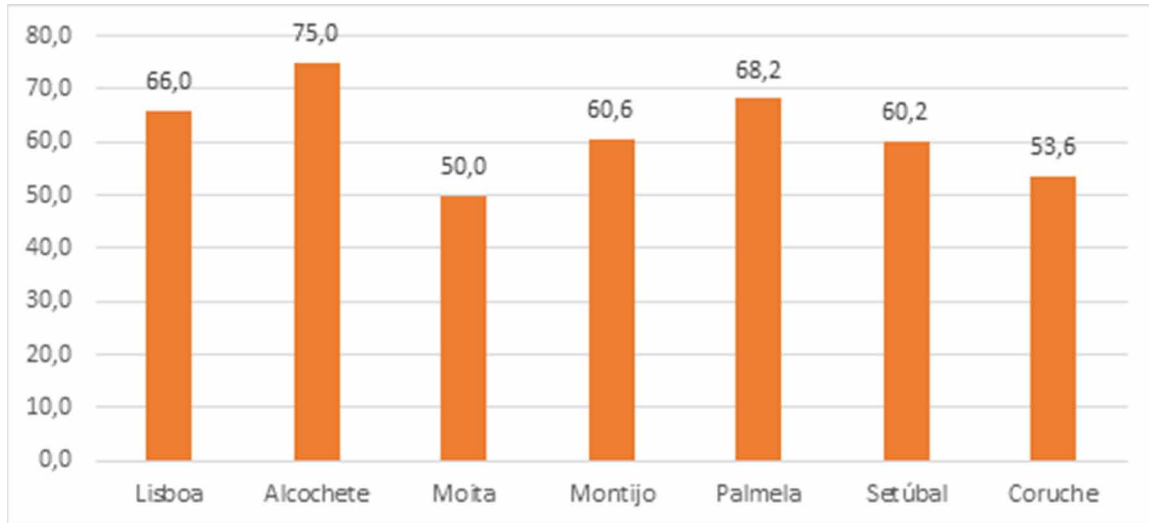


Figure 11. Subsistence rate of industry, construction, and energy companies

Source: Pordata – Subsistence rate statistics, updated by county (2020)

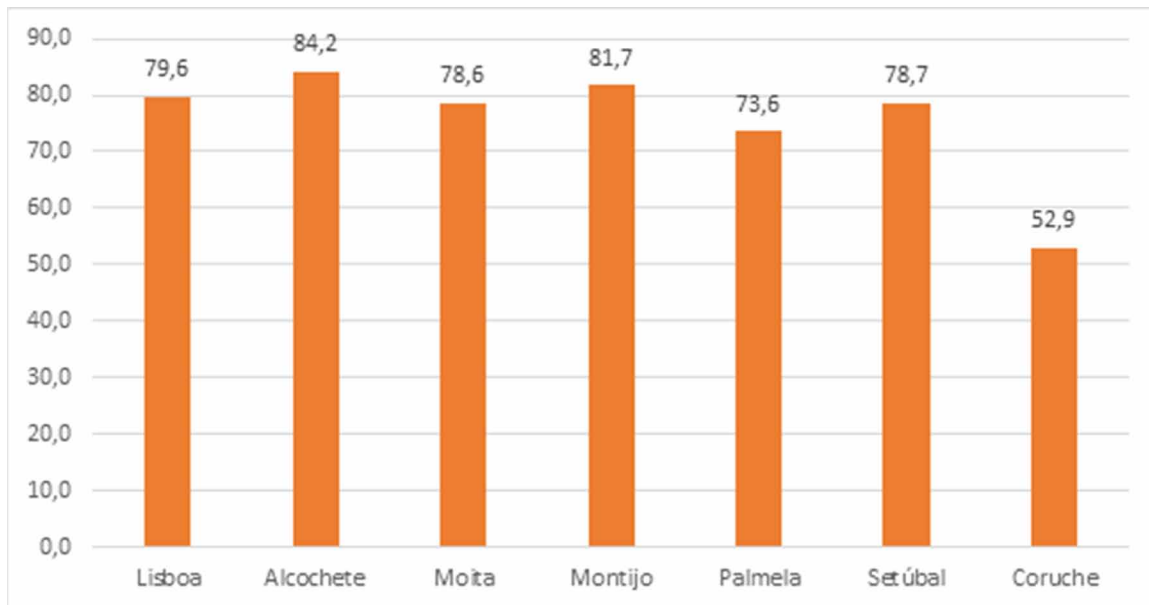
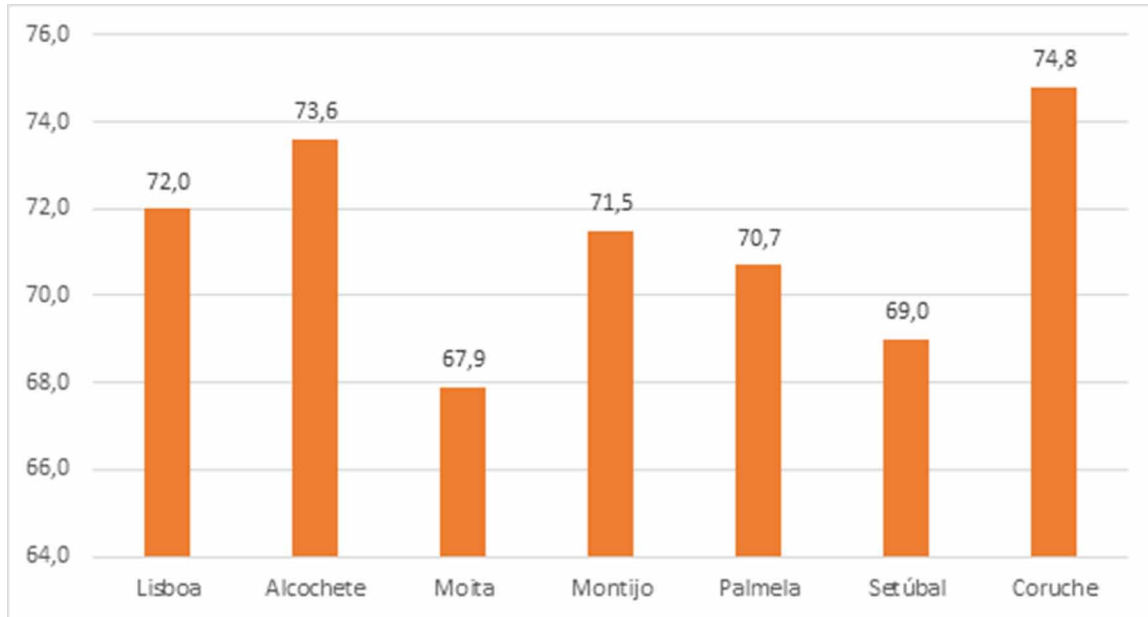


Figure 12. Subsistence rate of services companies

Source: Pordata – Subsistence rate statistics, updated by county (2020)



Thus, it is verified that entrepreneurial activity has increased in Montijo municipality, with special emphasis on the services sector, being even the municipality with the highest growth rate of established companies (20%), based on the comparison of the number of companies established in 2009 and 2018.

In addition, there seems to be data suggesting that the municipality has managed to create an attractive environment for the development of entrepreneurship, being one of the municipalities with the highest subsistence rate of newly established companies, being this indicator 71,9% in 2018.

A REFLECTION ON THE ENTREPRENEURIAL ACTIVITY THAT ENHANCES TOURISM IN MONTIJO MUNICIPALITY AND THE CHALLENGES OF THE PANDEMIC

The covid-19 pandemic is having a very negative economic and social impact on the economy in Portugal and 2020 represents the biggest economic recession since the 1970s.

Nevertheless, the pandemic situation has also had a major impact on people's way of life and on the business models of companies themselves, information and communication technologies playing a central role in societies and organizations.

In this way, because of lockdown, telework became widespread and people and organizations began to communicate regularly remotely, replacing personal contact with collaborative digital platforms. Besides, travelling being impossible or very difficult, internet has become a centerpiece in the search for information by people and organizations, reducing barriers associated with cultures and distances.

Thus, the current pandemic situation, in addition to all the negative impacts it has had, may also, represent an opportunity for the development of entrepreneurship and for greater dissemination of ter-

Entrepreneurial Activity Dynamics That Enhance Tourism in Montijo Municipality

territories located in large metropolitan areas and that act as an important support for those who work in major cities.

As mentioned in the previous points, Montijo municipality has various singularities associated with its history, heritage, and territory. However, it has not been able to capitalize on these specificities in attractive tourist products, because it remains a region more associated with the possibility of cheaper housing compared to the city of Lisbon.

Whereas people and organizations are increasingly tended to plan their daily lives based on the information available on the internet, digital marketing appears as an excellent opportunity to disseminate the region and to promote entrepreneurship and business, with a special focus on tourism activity. This opportunity becomes even more relevant, because in the impossibility of major international travel, businesses and people have chosen local economic agents to meet their needs. At leisure level, people and companies have sought to discover new activities and new occupation forms in the nearest territories. Thus, the regions that have typically been the target of lower demand, they now have the possibility to show themselves, attracting people and economic agents who, before the pandemic situation, would not even consider visiting them.

However, such an opportunity can only be taken by regions that implement appropriate marketing strategies to the current context, which ensure greater visibility of their territory, heritage, and culture.

In this sense, the creation of an interactive portal for the presentation of the region, which includes municipality main offers, may lead to a greater knowledge of qualified products and services and economic operators, as well as a promotion of cross-selling from different companies.

With regard, more specifically, to the tourism activity, may lead to roadmaps creation, dissemination and promotion, representing a true bridge between the east and west parts of the territory, linking heritage and leisure activities associated with natural landscape and the riverside area, with gastronomy, region wines, historical assets, and other unique regional products such as floriculture, pork products and cork.

Whereas Montijo is one of the youngest regions in the country and that the working population has a relevant level of qualification, this possibility, it can also significantly leverage the boosting of qualified entrepreneurship in the most diverse economic activities, with a special focus on creative industries, taking advantage of imagination and irreverence always associated with young people.

Finally, digital marketing should be associated with logistics processes that ensure rapid contact between producers and consumers and even provide greater cost efficiency through the simultaneous transport of offers from different producers. In logistics processes, short commercialisation circuits may also be used to allow the sale and dissemination of traditional and qualified products in the region (for example, a basket of regional products from farms and industries associated with pig farming or from agricultural and river products could be created).

It is also essential to boost innovative business models that value community and territory proximity, concerning local suppliers, local community human resources training and hiring, region development enhancing and employment stimulating, as well as social well-being.

Equally important will be entrepreneurship and innovation commitment and information technologies adaptation and adoption, in order to enhance the renewal of both companies from traditional industrial sector (meat processing, wine and cork), as start-ups with high competitiveness and sustainability impact solutions on the of the territory (start-ups related to nature tourism, adventure, rural, catering, sustainable and environmentally friendly urban mobility services, among others).

The municipality should not be oblivious to circular economy and new models based on this concept, important for its development. With a traditional industry linked to the meat processing, wine and cork,

the focus on reducing waste production and transforming it into by-products or new materials in the supply chain of the county's companies, it is also a path that should not be ignored. This waste should be considered assets, which leads to the efficient management of natural resources, the reduction of waste costs, but also in a healthier, more attractive, and more visitable environment for tourists.

Finally, in a post-Covid regional economy Montijo, in line with the creation of regional roadmaps, should focus on cooperation between producers, entrepreneurs and other stakeholders who can contribute to the complementarity of products and services and enrich the tourist experience.

CONCLUSIONS

Some conclusions and final considerations deserve to be recorded. Tourism contribution to sustainable development objectives achievement, economic, social, and environmental development promoting, implies a balance among profits to be generated by the sector, response to tourists needs and expectations, community involvement and efficient environmental management.

This is also a major challenge for Montijo municipality, in a Post-Covid era where new business models, new products and services, new distribution and marketing forms, must be based on information and communication technologies potential, to disseminate the region and to add value to the tourist experience and business, where circular economy will be an unavoidable trend.

Montijo municipality constitutes itself as a county that presents a set of strengths both in terms of the economic structure and business, as at cultural and social level and, although some weaknesses are also pointed out, evidence preparation to embrace interesting development opportunities.

With a set of positive indicators with regard to tourism activity, the county has an accommodation capacity and an occupancy-bed rate higher than most of the values recorded in the other municipalities.

In addition, Montijo municipality proves to be one of the most dynamic at national level in terms of entrepreneurship and in 2018 (latest data available), was ranked 7th in the national ranking in terms of company's establishment, in all economic activity sectors. Finally, regarding the overall values of the company's subsistence rate, Montijo is one of the three municipalities pointed out in the study that presents better values in this indicator.

To finish, an important note: throughout the *focus group session and* interviews, there was great expectation regarding future investments planned to the county, with emphasis on Lisbon Airport. The expectation is for development and growth, with great impact on business activity and the increase in the quality of life of Montijo people.

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Chapter 3

Implementing Acceleration Programs: Reflections for Academic Business Incubators Through a Portuguese Case Study

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ABSTRACT

In a complex business world, startups need to quickly test their value propositions and go to business development as soon as possible with the best strategic fit to the market. Startups that start their journey at academic business incubators are mostly knowledge based or technology based and need adaptable acceleration programmes that allow them to improve their management capabilities at the same time as they achieve market fit and technology development until revenue. This chapter aims to explore some frameworks for acceleration programmes adjustable to academic business incubators and their incubatees, attending best practices already published. In addition, it draws some possible strategies and reflections for a framework as a proposal for acceleration programme at academic business incubators.

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INTRODUCTION

European Union (EU) strategies for regional development have been consolidating a position to stimulate open innovation and knowledge transfer (DGRIEC, 2014), pointing out that Higher Education Institutions (HEI) play a central role and need to be more entrepreneurial and catalyse the interactions between HEI, industry, government, civil society, and the environment (Etzkowitz & Leydesdorff, 2000; Carayannis et al., 2018).

For that matter, HEIs have been implementing all kinds of interactions with their regional stakeholders such as being part of regional associations, developing research and action projects alongside with industry and integrating processes of technology transfer (e.g. patent licence). Those are some traditional interactions that most of HEIs integrate in their missions. To go further and have a more direct impact in the creation of new and innovative ventures, HEIs have also been implementing their own incubators and acceleration programmes, recruiting their teachers, students, graduates, and researchers for those entrepreneurial based activities.

The efficiency of academic business incubators and academic acceleration programmes are yet to be proven, as there is insufficient data for analysis, but there are already some studies that consider academic business incubators as an important instrument of economic dynamism. Some conclusions address the creation of spin-offs, technology and knowledge transfer for companies' development, advancement of market growth and entrepreneurial culture (Mian, 1996; Lalkaka, 2001; CSES, 2002; Grimaldi & Grandi, 2005; Van Burg et al., 2008; Somsuk & Laosirihongthong, 2014; Carvalho & Galina, 2015; Stal et al., 2016). There are also some studies that concluded that incubated firms outperform non-incubated firms in both sales' growth and employment. When it comes to acceleration programmes, some authors state that there's evidence of systematic short-term growth advantages for startups that participate in accelerators compared to those that do not (Roberts & Lall, 2019).

But from the point of view of HEIs, especially the ones that already have academic business incubators implemented, and want to start an acceleration programme, there are some questions that need to have clear answers:

- How can HEIs boost entrepreneurial creation by using their own incubation structures?
- How can HEIs enrol their regional stakeholders, especially industry, in this entrepreneurial support process?
- Will entrepreneurs that are involved in these acceleration programmes be successful?
- Will their companies succeed after leaving their parent institution?
- Will these companies have a great impact on regional and national development?
- Will the methodologies used before the 2020 pandemic crisis need to be adjusted to the after crisis?

These are very important questions, and their answers are of the utmost importance. HEIs need to look for these answers before implementing their own acceleration programmes. This chapter looks for the features that these kinds of programmes integrate and presents some reasons for their implementation, both from HEIs and incubators' side and from participants' side. Adaptability of methodologies due to the 2020 pandemic crisis needs to be addressed, but it might take a few years before research has a clear evidence about its effects on the actual procedures that incubators and accelerators implement. Short term

implementations were seen around the world, with conferences, seminars and summits changing from physical to online, but we still have not had the time to really understand the effects on future changes.

This chapter relies on an empirical study, based on the case of a Portuguese HEI that has been developing an entrepreneurial support structure under the concept of Academic Business Incubator (ABI) and aims to implement an acceleration programme under the ABI, after the recovering from the 2020 pandemic.

As a contribution to the topic, the purpose of this chapter is to present a literature review about acceleration programmes, with a focus on academic ones, and to present some reflections that can be of importance for ABIs that want to implement their own programmes.

Firstly, this chapter includes a brief literature review about ABI and acceleration programmes definition as well as the reasons behind their implementation. The second part describes the research methodology, and the ABI framework and description. The last two parts present best practices and the reflections for implementation strategy, conclusions, limitations, and directions for future research.

The methodology relies on an empirical and exploratory case study, including a mix of qualitative and quantitative approaches, to explore the ABI designated as IPStartUp and its main structure.

LITERATURE REVIEW

Concepts for Business Incubators (BI), Academic Business Incubators (ABI) and Their Best Practices

While this chapter focuses on accelerators and acceleration programmes, often these concepts are linked with incubators and some incubators are related to HEI. The case study presented in this chapter is related to a model for an accelerator inside a HEI. For that matter, some brief concepts about incubators are presented in the literature review.

Academic Business Incubators (ABI) or University Business Incubators (UBI) – that for the propose of this chapter are considered similar concepts – were created around the broader concept of Business Incubator (BI) and are managed by HEIs. Both (BI and ABI) were designed as tools to boost new business creation, by providing support and resources to entrepreneurs and helping them in the establishment and development of their projects, most of the times from the very beginning of their idea, and helping them to launch and marke their products and services (Pinto, Ossmane & Carvalho, 2020). Sometimes they also enter in the promotion and commercialization of innovative ideas (Theodoraki, Messeghem & Rice, 2017).

By labelling BIs, literature review tends to find many distinctive denominations and structures such as: traditional incubators; business centres; technological and innovation centres or the latest “new economy incubators”. From the first generation that provided basic services such as business development support and access to networks (Bruneel et al., 2012), they evolved and extended their value proposition and got to a third generation which also provides more complex services. As they grow and get more mature, management strategies adopt the interests of their institutional logic, stakeholders’ goals, and strategic focus (Nicholls-Nixon et al., 2018).

On the other hand, ABIs have been considered by many authors as relevant actors when it comes to:

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- Support academic entrepreneurship (Mian, 1996; Lalkaka, 2001; CSES, 2002; Grimaldi & Grandi, 2005; Van Burg et al., 2008; Somsuk & Laosirihongthong, 2014; Stal et al., 2016);
- Promote regional development (Grimaldi & Grandi, 2005);
- Promote innovation and entrepreneurship among the internal and external environments, through education in entrepreneurship and support for new ventures at different lifecycle stages (Grimaldi & Grandi, 2005; Nicholls-Nixon et al., 2018);
- Have impact on commercializing intellectual property which originates in their academic labs (Grimaldi & Grandi, 2005; Nicholls-Nixon et al., 2018);
- Have a structure that promotes and support innovations across all HEI departments, including social sciences, humanities, and liberal arts (Nicholls-Nixon et al., 2018);
- Put emphasis on knowledge sharing and scientific transfer to society (CSES, 2002; Grimaldi & Grandi, 2005);
- Complement support with continuous access to specific academic infrastructures such as laboratories and other facilities (Grimaldi & Grandi, 2005; McAdam & McAdam, 2008; Aaboen, 2009);
- Provide access to academic networking (Grimaldi & Grandi, 2005; McAdam & McAdam, 2008; Aaboen, 2009);
- Direct knowledge from HEI to incubated companies and trigger knowledge exchange, resources and business process that enhance mutual value creation (Rothaermel & Thursby, 2005).

Despite the relevance of ABIs, its creation involves a lot of resources, senior management commitment, vision and organizational infrastructures and is also subject to local and regional contexts as well as to the institutional will to support such a venture (Pinto et al., 2020). The decision to implement ABIs is also affected by the existence of other resources, such as venture capital, social capital, or public investments in R&D, and, according to Fini et al (2011), HEIs should invest in their own support mechanisms if there are not available resources at local or regional level.

The decision of implementing an ABI encompasses a lot of choices. Arguing that there is not a “best practice” that fits all, the management team or director must identify the incubating model that fits it best (Grimaldi & Grandi, 2005; Nicholls-Nixon et al., 2018) as well as its path to growth and adjustments. As business incubators are learning organizations and grow as start-ups themselves (Carvalho & Galina, 2015; Carvalho, Backx & Galina, 2019; Carvalho, Backx & Mine, 2020), adjusting processes and procedures and improving results are part of the day-to-day jobs to be done.

Concepts for Accelerators

Overall Remarks

Accelerators have emerged over the last decade and have been growing rapidly since the first one, Y Combinator, was founded in 2005 and established itself in Silicon Valley (Wright, 2018).

There's limited research on the accelerator phenomenon, mainly due to its newness and limited data availability (Hochberg, 2016). For these reasons, accelerators definition remains discordant (Hochberg, 2016; Crisan, et al., 2019).

At some point, concept of accelerator may be confused with the incubator concept or with an innovation intermediary (Crisan, et al., 2019). Despite that, there are some proposed definitions that evidence

a clear distinction (while some interconnections) illustrated in table 1, that can shed some light over the concept definition of accelerators.

Table 1. Accelerator concept: literature review concept proposes

Concept definition	Authors
<i>"[...] a late-stage incubation programme, assisting entrepreneurial firms that are more mature and ready for external financing or a facility that houses a modified business incubation programme designed for incubator graduates as they ease into the market."</i>	Lewis et al (2011, p. 17)
<i>"A fixed-term, cohort-based programme, including mentorship and educational components, that culminates in a public pitch event or demo-day".</i>	Cohen & Hochberg (2014, p.4)
A deal aggregator which builds the growth venture ecosystem, promoting this growth within a short-term period.	Cohen & Hochberg (2014)
<i>"[...] organizations which provide support for startups in order to accelerate their development through one or more processes: learning, validation, access & growth, and innovation."</i>	Crisan et al. (2019, p.19)
<i>"[...] a unique mechanism of entrepreneurship support provided by the new organizational form called the accelerator"</i>	Shankar & Clausen (2020, p.2)

Source: own elaboration, based on literature review

Continuing the conceptual domain, Shankar and Clausen (2020) propose an approach that puts the focus on the “acceleration” process, aiming to bring conceptual distinctiveness and clarity to the concept of acceleration, instead of the accelerator. They identify at least three key functions that make it unique:

- Accelerate startups that have achieved product-market fit;
- Provide time-compressed scaling;
- Enable aggressive scalability testing.

As it seems, in the last years, accelerators have become important players in the early-stage entrepreneurial ecosystem (Hochberg, 2016, Pauwels 2016). According to Miller and Bound (2011) these accelerators’ evolution depends on three market trends which have promoted the appearance of a new kind of startups (agile, talented, technology-based teams able to quickly iterate a product or service) that accelerators have grown up to serve:

- Easier direct monetization;
- Cheaper technology costs;
- Easier routes to customer acquisition.

So, accelerators have certain similarities to incubators, but they are not the same. Accelerators have limited-duration programmes (Cohen, 2014; Cohen & Hochberg, 2014; Pauwels, 2016) and provide services to enable rapid progress as monitoring, education, and continued networking opportunities, offering, typically, pre-seed investment (Cohen, 2014; Pauwels, 2016). Accelerators can or cannot be linked to one or more incubators and for that matter Goswami et al. (2017), have seen commonalities between the accelerator expertise that they propose and the relational connections, interactive processes, and normative alignment that occur in incubators.

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For Pauwels et al. (2016) the specific accelerators' key design parameters, such as programme package, strategic focus, selection process, funding structure and alumni relations, could define accelerators as a new generation incubation model.

Furthermore, differences exist not only between incubators and accelerators but between different types of accelerators, depending on the organizational context in which they operate and their specific strategies and goals (e.g. corporate *versus* university accelerators) (Kanbach, 2016; Pauwels et al., 2016; Wright, 2018; Crisan, et al., 2019). Based on this perspective, there is a third identified accelerator theme, the “welfare stimulator” accelerator, which is typically sited up by government agencies as a main stakeholder with the focus on fostering economic growth, within a specific region or a specific technological domain. Additionally, hybrid accelerators can also be a possibility, under specific objectives of the shareholders (Pauwels et al., 2016).

Accelerators as part of the Entrepreneurial Ecosystem Context

Entrepreneurial ecosystems involve multi-level processes and stakeholders, multiple actors, and multiple contexts and as there's different contexts, also different and linked approaches must be considered, rather than trying to copy other entrepreneurial ecosystems (Isenberg, 2010). The existing clusters have already competitive advantages, based on economic specific dynamics and local resources, and stakeholders should pave the way for young ventures that are aligned with the market, otherwise it can lead to perverse outcomes (Isenberg, 2010). Entrepreneur's ability to discover and develop opportunities and to access key resources depends on the geographical proximity to stakeholders (Acs et al., 2016).

The nature and quality of entrepreneurial activities, either as acceleration programmes or startup creation, depend on their entrepreneurial ecosystem and on the types of organizational forms that they validate and accept, and not only on the opportunity identification. Thus, accelerators' operation depends on a variety of stakeholders which must be involved (Wright et al., 2017; Wright, 2018). Besides HEI objectives and strategies relating to academic entrepreneurship, which affect student entrepreneurship, university contexts (scale, scope, research quality, history and culture, location and local networks, resources, and capabilities) are often predictors of the entrepreneurship support mechanisms. For instance, while land-grant universities, with a strong economic development mission tend to enhance academic entrepreneurship and student entrepreneurship, that is typically not seen at private universities (Wright et al., 2017).

The relationship that universities historically nurture within their regions influences the ability to reach-out to the local community to participate in the ecosystem building (Wright et al., 2017). This approach corroborates with Ricci et al. (2019), who argue that to avoid being ineffective or even counter-productive, entrepreneurship and technology transfer strategies must consider the region characteristics (e.g. the level of employment and innovativeness of regional industry) as well as their organizational resources. They also argue that it might be risky focusing on research commercialization in a not “ready” ecosystem.

While on one hand entrepreneurship may be considered as a transforming and positive attitude, Wright et al. (2017) suggest that entrepreneurship may also have a negative connotation for many academics and students on campus. This embedded culture is something that HEI governance must evaluate, although this is possible to change, preferably with the promotion of bottom-up activities to empower academic entrepreneurship (Isenberg, 2010; Wright et al., 2017).

How do Accelerators Work?

Some accelerators are affiliated with other organizations such as venture capital firms, angel groups, corporations, universities, local governments or non-governmental organizations (Barrehag et al., 2012; Cohen, 2014; Cohen and Hochberg, 2014; Wright, 2018).

There are also different kinds of acceleration programmes: some are for-profit, and others are not, and they may vary in the amount of remuneration, the size of the equity stake taken, the mentorship and educational programme, the industry vertical focus and the availability of facilities.

Strategy and Target Focus

Overall, accelerators seem to focus on certain themes rather than being generic and to choose between being local *versus* international (Hallen, Bingham, and Cohen, 2014; Pauwels et al., 2016; Wright, 2018; GAN, 2019). However, there are many generalist accelerators across industries (Hochberg, 2016).

Hochberg (2016) states that the admission criteria vary among accelerators. Some admission criteria are based on the accelerator's founders' preferences; some consider themselves generalists and select the ideas with the most potential and others select early-stage firms that represent the industry mix in their region. The most notable trend over the last five to six years has been the movement towards vertically specialized accelerators, not just software-focused (Barrehag et al., 2012; GAN, 2019), but also focused on hardware or other physical product. This may put some different challenges on these programmes' success, since they need to provide higher capital, while the timeline for this kind of startups is longer (Hochberg, 2016).

Some accelerators focus on new venture scaling rather than new venture birthing, being complementary to other support mechanisms like incubation. Despite some trends in focusing on late-stage startups (GAN, 2019) these accelerators often look for new earlier-stage ventures that have at least a working business model with initial customers, that have raised some investment or hired employees (Shankar and Clausen, 2020). In fact, some authors emphasize the importance to support high potential startups to prevent money waste, corroborating these strategies (Shane, 2009; Acs et al., 2016).

Hallen, Bingham, and Cohen (2014) argue that university accelerators' programmes typically require applicants to have some affiliation with the educational institution. This would have the goal to foster educational opportunities rather than future profitability potential for the businesses. Overall, they are usually agnostic when it comes to technology focus (Dempwolf et al., 2014).

Selection process

New ventures enter and exit the acceleration programmes in groups, known as cohorts or batches, within a competitive selection process and at an early stage (Cohen, 2014; Cohen & Hochberg, 2014). The selection process is based on a multi-staged and rigorous process, usually an online software platform, often with a high number of applicants and sometimes with a previous scouting process (Barrehag et al., 2012; Cohen & Hochberg, 2014). Cohort model promotes the development of strong relationships, bonds and communal identity between founders of different ventures in the same accelerator cohort and make accelerator's processes more organized and efficient, outreaching around key dates (Cohen & Hochberg, 2014).

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Then, different types of stakeholders (mentors, investors, alumni) are asked to participate in a standardized and personal screening process, where startups are invited to present their ideas. However, teams are the main selection factor (Barrehag et al., 2012; Pauwels et al., 2016). In some accelerators, individual entrepreneurs are helped to find and form the team, according to specific skills they are missing (e.g. Le Camping's event "Adopt a CTO"). Some accelerators have the requirement that at least one team member must possess technical skills (Barrehag et al., 2012). In other accelerators, there are in-house entrepreneurs, paid or not, who can join entrepreneurial teams and work closely together with them (Pauwels et al., 2016).

In the specific case of welfare stimulators, selection may be shaped by the vision of welfare creation and in a very early stage, most of the times without a clear business model in place (Pauwels et al., 2016).

Duration / Timeline

Acceleration involves speed and direction (Shankar & Clausen, 2020), during established timelines (3 months in average) and strict graduation, forcing startups to face the selection mechanisms that operate in the market (Barrehag et al., 2012; Cohen & Hochberg, 2014), speeding out the exit of the venture, either by success or failure, and promote "growth" under time-compressed goals (Shankar and Clausen, 2020). University accelerators' programmes usually run these programmes during the summer months (Hallen, Bingham, and Cohen, 2014).

Establishing time-lines forces founders to work hardly to rapidly achieve the milestones. Accelerator directors spend more time dedicated to help and influence ventures, encouraging them to learn and adapt. Since the programme is short, it is easier to gather mentors, guest speakers, and other resources, that are more likely to be committed. Thus, startups often quickly grow or fail, which may mean moving on to a higher value opportunity for their founders and other organizations in the market (Cohen, 2014; Cohen & Hochberg, 2014)

Mentoring

Although mentorship varies substantially among programmes, ventures are often guided by accelerators directors on the learning process within mentor meetings, seminars, and other activities (Cohen, 2014; Cohen & Hochberg 2014). Mentors are considered key stakeholders in the entrepreneurial ecosystem, not only for guiding startups in their journey but also for increasing startups human capital through their own network (Barrehag et al., 2012).

Pauwels et al. (2016) argue that there are well-elaborated and planned mentoring services, in which mentors are evaluated and matched with each venture, helping ventures to define their business model and to connect with other stakeholders like customers and investors. This connection opportunities are often promoted under demo days or investor days where customers and/or investors visit the accelerator and attend portfolio companies' presentations, with formal and informal network opportunities. These intense mentorship and extensive education bring the possibility of meeting with many mentors, which provides opportunities for ventures to build their social network and learn about alternate strategies (Cohen & Hochberg, 2014).

In the case of welfare accelerators, because of their specific vision, education programmes are more developed in comparison with corporates or university accelerators. The mentors, usually consultants

or business developers, are deeply close to ventures, guiding and advising them on their development (Pauwels et al., 2016).

Educational programmes

At accelerators, educational programmes are based on intense mentorship and extensive education, including seminars on a wide range of entrepreneurship topics (Barrehag et al., 2012; Cohen & Hochberg 2014; Pauwels et al., 2016; Wright, 2018). Furthermore, the programmes include frequent (weekly) counselling services, based on business assistance and progress monitoring, provided by the accelerator management team. Besides, a shared office space is often offered, encouraging collaboration and peer-to-peer learning (Barrehag et al., 2012; Pauwels et al., 2016).

Alumni relations

Accelerators usually nurture alumni relations, inviting them to participate in the programmes and share their knowledge. Their companies are usually a reference to ventures in the process and are actively involved in the mentoring activities and sometimes on startups' investment (Pauwels et al., 2016).

Funding and Investment

Most accelerators are privately owned (Cohen & Hochberg 2014; GAN, 2019) but shareholders can also be public authorities (Miller & Bound, 2011; Barrehag et al., 2012). Despite this, most accelerators complement these sources with revenues, such as investments in the startups they support, events, workshops or registration fees for training courses (Miller & Bound, 2011; Pauwels et al., 2016).

Many accelerator programmes provide a small seed investment to their startups and receive an equity stake in the portfolio company in return, which varies from programme to programme (Miller & Bound; 2011; Barrehag et al., 2012; Hochberg, 2016; Pauwels et al., 2016; GAN, 2019). Some also offer a larger, guaranteed investment in the startup, in the form of a convertible note, upon graduation (Hochberg, 2016), while others have a clause that turns the investment into a soft loan which is returned if certain conditions are met (Miller & Bound, 2011).

One of the last trends observed on accelerators is their vertical integration into Seed Funds, as accelerator directors can take advantage of information gathered on startups during the accelerator programme (Hochberg, 2016).

Even if accelerators survival depends on their investment strategy and its success, some of the accelerator programmes' investors are not for-profit investors. The return is sometimes a broader economic benefit and not only a financial return (Miller & Bound, 2011). Dempwolf et al. (2014) identified that University accelerators throughout the United States are educational non-profits, aiming to accelerate entrepreneurial competencies development among students and faculties and promote innovation at universities.

Unlike many other accelerators (GAN, 2019), venture capital firms (VCs) are usually not the most popular funding source for students' startups, especially those which do not have intellectual property assets, because usually there is no matching between the capital amount provided by these investors and the needs of the startups. Many of the university's accelerators' programmes include prizes under business plans and pitching competitions, where funders may be the university but also corporate and

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other philanthropic sponsors. Some universities have established seed capital funds to support students' early-stage ventures (Wright et al., 2017) and overcome their early funding struggles.

Because of the interest that accelerators directors or stakeholders have on the accelerator, ventures usually have a faster growth compared with incubators tenants (Cohen & Hochberg, 2014).

Expected Outcomes After Acceleration Activities

Specific goals in different contexts (government, corporate, community or university) seem to define what accelerators do (Barrehag et al., 2012; Kanbach, 2016; Pauwels et al., 2016; Wright, 2018; Crisan et al., 2019) and condition their lengths of interventions and different types of outcomes (Crisan et al., 2019).

Crişan et al (2019) aimed to provide a holistic understanding of the acceleration *modus operandi*, addressing the context in which accelerators operate, their practices and services, as well as the outcomes they achieve. They identified a set of mechanisms that define accelerators' *modus operandi* and make accelerators what they are. They also explain their impact, proposing a framework and identifying examples of best practices that can be transferred across contexts.

Table 2 resumes the three basic mechanisms and their respective expected outcomes.

Table 2. Accelerators *modus operandi* and outcomes

Learning/validating	<ul style="list-style-type: none"> • Acquiring new/relevant information • Business and technological knowledge • Social capital • Self-confidence • Market success
Access and growth	<ul style="list-style-type: none"> • Access to investors • Product development and launch • Higher survival rates and profit
Access Innovation	<ul style="list-style-type: none"> • Technologies with high impact on the market • Qualified employment • Different technological paradigm for an industry

Source: own elaboration, based on Crisan et al (2019)

Learning and validation are often combined. These are basic activities on acceleration process for startups and may be the trigger for launching a business (i.e., a precursor to access and growth). According to Crisan *et al* (2019) these are common mechanisms at the university context accelerators and lead mainly to “soft” outcomes.

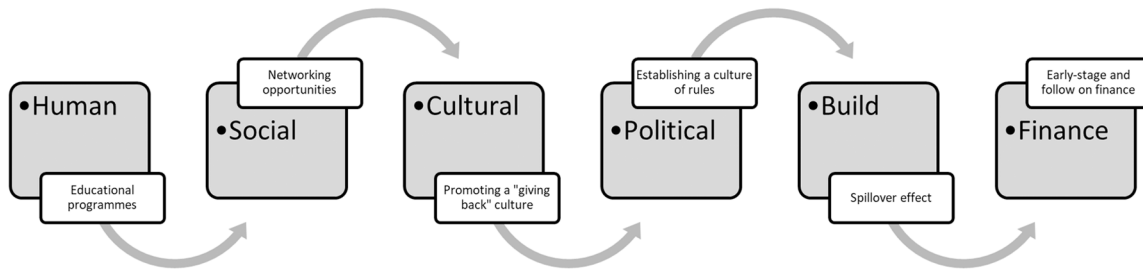
Access and growth emphasize market success, and according to Crisan et al (2019), this is the most common mechanism observed. Activities that can be seen here are mentoring; coaching; boot-camp training; preparation to pitch investors during the demo-day and networking.

Innovation was the last and second most observed mechanism. Although all accelerators have an innovation focus, these innovation accelerators support more complex innovation processes, requiring extended interventions such as research support, post-programme support, and longer interventions that often need to accompany efforts to develop and launch new products. These authors also argue that these mechanisms are truly what defines how accelerators operate.

Even when having into account specific contexts, the way in which accelerators operate seems to be explained by the connection between interventions and outcomes, rather than by the organizational context in which they are embedded.

Bliemel et al. (2019) tried to explain how accelerators can play a meaningful role at the cluster level by providing and enhancing Community Capital. In figure 1, some of these activities and related outcomes are presented.

Figure 1. Types of Community Capital enhanced by accelerators' activities
 Source: own elaboration, based on Bliemel et al. (2019)



Reasons Behind the Establishment of an Accelerator

Accelerators' benefits have been referred to in many studies and there are different reasons to establish one according to its link to different kinds of entities such as incubators, corporates, or venture capitals.

Creating an entrepreneurial ecosystem, by encouraging startups in the community, is one of the main reasons pointed by Christiansen (2009) to start a seed accelerator programme. The expected long-term employment from those companies has the potential to build a strong influence in their community (Christiansen, 2009).

Although it is possible to produce 'high-potential' ventures without participating in acceleration processes (Bliemel et al. 2019), some authors state that there is evidence of systematic short-term growth advantages for startups that participate in accelerators compared to those that do not (Roberts & Lall, 2019).

In the university scope, Miles et al. (2017) suggest that accelerators can facilitate entrepreneurship learning among students through the startup experience, which may be this kind of accelerators' main reason of existence. Through their experience on accelerators programmes, nascent entrepreneurs have

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the opportunity for an authentic self-assessment of their mastery of critical entrepreneurial competencies, reducing the risk on new venture creation.

That lack of expertise, knowledge, and resources, which are needed to bring research results to market, often makes ventures fall in the “Valley of Death”, resulting in a tremendous net loss to society, both in innovation as in job creation (Byrd et al., 2017).

Thus, accelerators can provide participants the skills and means to enable the technology transfer from university bench or mature corporates to the market throughout the new ventures.

Besides the value for startup founders, most of accelerator stakeholders take benefits from these programmes. Accelerators create new deal-flow for investors, facilitating the networking with young founders and companies, which otherwise would not have any contact with the world of investment (Miller & Bound, 2011).

By scouting new talent, filtering down to only the highest quality, and concentrating them on a focal point, investors can have easier access to them, spending less time and resources (Miller and Bound, 2011; Barrehag et al., 2012; Cohen, 2014; Hochberg, 2016; Wright, 2018). Moreover, while being involved in the process, investors, often as mentors, get more information on startups progress and potential, establish relationships at an early phase and can make more informed decisions about companies to invest in the future, being more aware about future trends in technology (Miller & Bound, 2011; Hochberg, 2016).

Furthermore, accelerators are also a target for investors, since they use them to fund their activities from their capital and accelerators are a source of deals that facilitate the ventures funding due diligence process (Barrehag et al., 2012; Hochberg, 2016).

Corporations, especially large technology firms, often engage in these programmes, because on one hand they see business opportunities when new startups can use their technology (Miller and Bound, 2011), on the other hand they promote innovation and value which can be added to their own business processes (Miller & Bound, 2011; Wright et al., 2017; Wright, 2018).

When it comes to set up their own accelerator programme, corporations may have other goals. They may want to use it as a deal-flow maker; to enter as investors and startups shareholders; to create an ecosystem of costumers and other stakeholders in the community; to have access to knowledge and innovation opportunities; to integrate new products and services into their value chain; to promote an entrepreneurship culture within the organization or to create a good image on the market (Kanbach, 2016; Pauwels et al., 2016).

Reasons to Apply to an Accelerator

Startup founders apply for acceleration programmes for many reasons, as they find a pool of means and resources concentrated in one place, which would be individually costly for an entrepreneur to find and obtain (Hochberg, 2016).

That concentration of means and the focus it brings to focus on their startup’s development on a full-time dedication, is another important reason (Miller & Bound, 2011).

Even though accelerators are complements and not substitutes to more experienced and connected founders (Hallen, Bingham, & Cohen, 2014), through mentoring or events, accelerators provide access to investors, business experts and senior entrepreneurs, allowing startup founders to get opportunities and feedback on their products (Christiansen, 2009; Miller and Bound, 2011).

Validation and credibility are other reasons: accelerators tend to give some labels as “promising startups”, fostering visibility and future opportunities (Christiansen, 2009; Miller & Bound, 2011; Wright, 2018).

The pressure and discipline that characterize acceleration programmes, with deadlines and basic framework to achieve milestones, were also mentioned as helpful, since startups have some difficulty to do it themselves at the beginning of their path (Miller and Bound, 2011). Accelerator programmes' structure leads to thinking and working habits and practices, which promotes startups focus and organization, helping them to move from their chaotic and informal structure (Wright, 2018).

In their study upon transnational entrepreneurs, Brown et al. (2019) suggest that accelerators open and shared nature, access to human capital, tacit knowledge and entrepreneurial culture, offer high potential for their peers and can be more valuable than other transactional services provided.

Besides all these recognized values, entrepreneurs only realize them mainly after entering the accelerators programmes (Bliemel et al., 2019). Before that, what they usually value the most is the possibility to get funds.

METHODOLOGY

The main purpose of this chapter is to find out the main characteristics of acceleration programmes (with a focus on ABI) and identified best practices, analysing them in the light of accelerators literature review. This analysis has the objective of presenting some clues and perspectives that allow a proposal of a framework to be implemented for academic business incubators (ABI), based on the case study of IPStartUp. Adaptability of processes and procedures in the after 2020 pandemic crisis will also be addressed, as possibilities, necessities or inevitabilities.

Under the scope of incubation literature, IPStartUp was implemented and developed as an ABI. For the purpose of this chapter, an empirical exploratory case study was adopted, with a mix of qualitative and quantitative approaches (Yin, 2009), supported by data from IPS internal databases, documents and regulations, reviewing and analysing them from October to December 2020. In order to correctly understand and frame all the data collected, IPStartUp staff contributed with clarifications in order to reach a better understanding about the strategy focus and the goals of the incubator. In addition, this research considered data from internal databases about incubation activity, entrepreneurship projects and company creation from 2015 to 2020.

According to Yin (2009), case studies can be used to determine whether a theory's proposition is correct or whether some alternative set of explanations might be more relevant. Also, the author emphasizes the importance of exploratory studies to underline some relevant future study propositions.

For the literature review the authors collected mainly publications after 2015, published in scientific journals, since the topic must be evaluated according to recent methods. However, some publications were considered prior to that year if they identify methods and respective results in academic environment. The search for relevance was carried out in several databases with the combined words "acceleration"; "business"; "accelerators", "university accelerators"; "business accelerators"; "entrepreneurs" and "ecosystems". After choosing the most relevant publications, cross-reference was also evaluated.

IPSTARTUP: ABI CASE STUDY

General Description

IPStartUp is an ABI, created in 2015, under Polytechnic Institute of Setúbal (IPS), a Portuguese medium-size HEI. IPS is a public HEI created in 1979, with five colleges covering areas of engineering, education, business administration and health care in two different locations, has around 7,000 students and follows general HEI strategies when it comes to nurturing innovation and knowledge, as well as entrepreneurship, innovation and technology transfer. In recent years, the institution enforced and stimulated active learning practices, promoting links with industry partners and enhancing entrepreneurship among its community.

IPStartUp is framed under IPS general regulation while having some specific rules. It mainly targets the IPS academic community (students, graduates, professors, and researchers) and looks for those who have innovative business ideas, either technology based or not, but that can be linked to one of the knowledge areas that IPS teaches among its colleges, which allows the recruitment of internal mentors.

IPStartUp is part of the National Incubators Network (RNI), which is a certified incubator for governmental support programmes, such as Startup Voucher, Incubation Voucher, Internationalization, R&D Vouchers and Startup Visa, which enhances the incubator's credibility and the recruitment of entrepreneurs that are external to IPS community (Pinto et al., 2020).

Incubation Model and Incubatees

Support model has three phases: pre-incubation, incubation and business development.

Pre-incubation encompasses the beginners' phase, mostly with students that arrive from ideas competitions and still need a lot of support when it comes to capacitation on business model and innovation. It usually takes less than 6 months but at the first years of the incubator, teams usually stay longer. According to the incubator manager, most of the participants were studying at the same time and had less time dedicated to the development of the idea. On the other hand, the efforts dedicated to accelerating ideas were not a priority for the incubator's internal team as other activities were being prioritized, such as communication activities inside classes; workshops for raising awareness about entrepreneurship; preparation of internal procedures and other activities towards an internal entrepreneurial culture.

Incubation encompasses the time needed to develop a first prototype, along with the piloting of the business model, the first business plan and financial estimates. According to the incubator's manager, a lot of teams did not get to the second phase because they lacked the motivation to go on or because they finalized their studies and needed to get a job. Most of the teams that entered this phase directly came from the Poliempreende competition (a business idea competition from the national Polytechnic network).

Teams enter the business development phase after incorporating. According to the data made available from the incubator, in November 2020 there were 17 teams in the incubation process (all three phases), from which 4 were already companies and 1 was an association. Two of these teams were accepted under the governmental programmed Startup Visa. All teams are less than 3 years old and most of them are 1 year old or less. Business ideas come from different fields of knowledge, representing the diversity of the HEI itself.

As a structure that complements its HEI entrepreneurship offer, IPStartUp seems to have demonstrated, even in few years, that it has an impact not only on putting people together and working on internal in-

novation systems but also as a support structure for those who want to develop their business ideas (Van Burg et al., 2008) and create companies (Fini et al., 2011).

Internal Processes and Support

Processes of learning and achievement along the way allowed the improvement of managerial practices (Van Burg et al., 2008; Carvalho & Galina, 2015; Carvalho, Backx & Galina, 2019; Carvalho, Backx & Mine, 2020).

With the aim of providing support to those entrepreneurs who wanted to develop their projects, IPStartUp used internal resources, such as tutors and mentors (Clarysse et al., 2005) and HEI links to regional stakeholders (Phan et al., 2005; Fini et al., 2011).

The awareness of entrepreneurship opportunities and the spread of the entrepreneurial spirit (Van Burg et al., 2008; Somsuk & Laosirihongthong, 2014; Nicholls-Nixon et al., 2018), followed the selection criteria of entrepreneur-focused and survival-of-the-fittest approaches (Bergek & Norrman, 2008; Nicholls-Nixon et al., 2018). Despite being a young incubator, it seems that the strategy selected fits both the promotion of entrepreneurial spirit and the separation of winners from losers, and results in a small but diversified portfolio, with entrepreneurs/teams representing a broad set of sectors (Bergek & Norrman, 2008).

The alignment with IPS knowledge transfer activities, is also notable on the first steps towards spin-off creation, as IPStartUp already received teams from the recently created IPS research centres. Even if technology transfer and intellectual property are still supported at an ad hoc basis, these interactions and practices may have direct impact on the creation of spin-offs (Van Burg et al., 2008; Fini et al., 2011; Berbegal-Mirabent et al., 2015; Carvalho & Galina, 2015; Carvalho, Backx & Galina, 2019; Carvalho, Backx & Mine, 2020).

To foster entrepreneurs' skills and to promote knowledge exchange, IPStartUp also develops regular activities like themed workshops and networking sessions (Van Burg et al., 2008; Somsuk & Laosirihongthong, 2014). Best practices exchange, and emotional support are some of the goals that can be achieved by these practices (McAdam & McAdam, 2008; Schwartz & Hornyh, 2010; Bøllingtoft, 2012). All these activities are also part of the dissemination scheme. Statements of young incubatee entrepreneurs also allow the dissemination of the entrepreneurial spirit as well as attract more young entrepreneurs to enter the incubation process and develop their business ideas (Van Burg et al., 2008).

Facilities such as physical office space; access to research and specific high-value data; access to laboratories and other specific in-house resources, allow for incubatees to get high value at low cost (Mian, 1997; McAdam & McAdam, 2008; Carvalho & Galina, 2015; Carvalho et al., 2019).

In addition, and following one of the most valued assets of ABIs, IPStartUp incubatees use the IPS image to open doors on complex issues like intellectual property, legal questions or reaching prospective customers at a very early stage (Mian, 1997; McAdam & McAdam, 2008; Carvalho & Galina, 2015; Pinto et al., 2020).

Networking Strategies

In order to grow, IPStartUp has been increasing networks, inside and outside IPS. The internal links to professors, researchers and other incubatees (former and current) provide mentoring on technology and business issues (Mian, 1997; Lee & Osteryoung, 2004; Clarysse et al., 2005; Rothaermel & Thursby,

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2005; Van Burg et al., 2008; Nosella & Grimaldi, 2009; Somsuk & Laosirihongthong, 2014). The external links to regional partners such as companies from different industries, public procurement entities, governmental SME support entities, business consultant partners and investment partners, complement these internal resources (Aaboen, 2009; Scillitoe & Chakrabarti, 2010; Fini et al., 2011) and provide a broader base of support both for IPStartUp internal team and to the incubatees, bringing knowledge, resources and key links to support entrepreneurs (Pinto et al., 2020).

Adapted Strategies for the 2020 Pandemic Crisis

Before the pandemic crisis, almost all incubatees received mentoring on a face-to-face basis and most of the meetings took place at IPS campus, either at IPStartUp facilities, or other available rooms. Networking sessions, such as presentations to partners, investors or other people, also took place in physical facilities.

After March 2020, all these arrangements had to be evaluated and an online strategy had to be designed. Tutorial and mentoring sessions continued, on the same regular basis, but using one of the platforms that were also used in IPS working and learning environments (usually Zoom or Microsoft Teams). According to the incubator manager, there was no evidence of struggles regarding tutorial or mentoring meetings and the follow ups were usually scheduled from session to session.

Regardless of the relative adaptative environment, both from the incubator and the incubatees side, according to the incubator manager, the most evident struggle was regarding the motivation of the entrepreneurs to stay focused on their projects. Most frequent complaints were towards the difficulty in reaching prospective customers when those customers were in the business to business (B2B) approach. According to the incubator manager there were some strategies implemented to overcome those struggles, such as trying different communication approaches (e.g. phone call, social networks reinforcement) but for some business ideas the final strategy was to completely change the business model or even to embrace a whole new business idea.

REFLECTIONS FOR A FRAMEWORK PROPOSAL

There is not enough evidence on what ecosystem elements must already be in place; on which accelerators' programmes lead to desirable effects (Hochberg; 2016; Roberts and Lall, 2019); there is a lack of an overall framework for understanding the ecosystem that supports student entrepreneurship (Wright et al., 2017) and defining one accelerator configuration seems difficult as not all accelerators achieve acceleration (Hallen, Bingham, and Cohen, 2014). However, some studies' results might be a platform for reflections on accelerators' creation, based on an operational evaluation of practice. The next recommendations were identified as the main ones when preparing the creation or the reformulation of an accelerator or of an acceleration programme. These recommendations are strongly focused on an academic base but do not yet reflect process or procedures adaptations after the 2020 pandemic crisis.

Strategy and Target Focus

The decision to start an accelerator encompasses many challenges. When it comes to universities, one might think that, because of their dimension and the knowledge concentration, they might be the centre of the entrepreneurial ecosystem, but universities alone do not drive it (Isenberg, 2010). In fact, this is

a result of a co-creation process, involving many stakeholders (students, faculty, university managers, academic business incubators, investors, business angel networks, local authorities, startups and corporates) each of them with different objectives, norms, standards and values. To function, universities must develop mechanisms for bringing together these stakeholders by establishing extensive and deep networks (Wright et al., 2017) and never losing a policy focus (Shankar & Clausen, 2020).

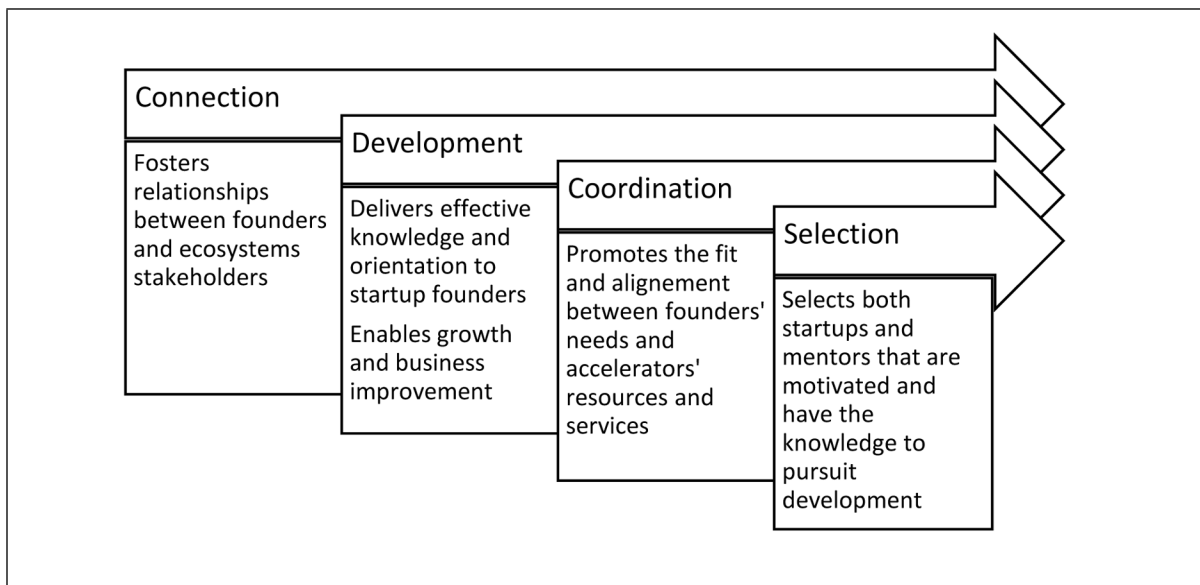
Expertise

Accelerators rely on their directors and stakeholders’ vision to achieve the best results, according to their goals. Goswami et al. (2017) argue that this vision conducts to intermediation processes which influence the commitment of the different actors:

- The regional entrepreneurial ecosystem by enhancing stakeholder cooperation;
- The venture validation by testing success or failure;
- The ecosystem knowledge by increasing ventures founder’s knowledge, even when their startups fail.

Goswami et al. (2017) also found out that there are four kinds of expertise that can make accelerators become meso-level intermediaries between startup founders and the regional entrepreneurial ecosystem. Table 3 shows how these expertise act as influencers.

Table 3. Accelerators expertise and impacts



Source: own elaboration, based on Goswami et al. (2017)

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So, to be able to guarantee a good expertise basis, accelerators founders or directors should be persons with experience in managing a startup company, experience as angel or seed investors or persons close to the industry field (Christiansen, 2009).

Branding

A clear programme structure allows accelerator managers to develop specific knowledge, skills and networks, which leads to delivering distinctive value to the new ventures they nurture, improving the performance and reputation of their programmes (Shankar & Clausen, 2020).

As quickly as possible, accelerators must prepare their brand dissemination, including information on their stakeholders and services, in order to attract other stakeholders and engage the existing ones (Christiansen, 2009; Barrehag et al., 2012).

Size

The number of startups accepted in the programme depends on the programme's focus as well as the funds available, but for new accelerators it is wise to start with few ventures and, when it proves successful, expand it. This is particularly important for accelerators whose industry focus requires higher amounts of seed funding (Christiansen, 2009).

Funding

It is important to provide funding for startups at a level which allows entrepreneurs to focus on their business. Furthermore, technology-oriented spinoffs from universities are capital-intensive startups that need different amounts of capital along the development phase (Christiansen, 2009). While accelerators need to take an equity stake in order to meet their own financial metrics (Christiansen, 2009), university accelerators don't usually take equity stakes in student-founded ventures (Dempwolf et al., 2014) and in this case, philanthropy and development officers could play a support role for student entrepreneurship, by attracting funds through gifts or investments from stakeholders such as alumni and corporate partners (Wright et al., 2017).

But funding startups might not be the first step for the implementation of an accelerator. According to Isenberg (2010) accelerators should accelerate growth instead of startups creation, and it is difficult to create value without growth. For this matter, it would be more beneficial to support a few high growth potential ventures than many limited growth potential startups, especially when resources are limited. Also, Shane (2009) and Acs et al. (2016) corroborate this by defending that it is better to invest in a few high-quality and promising startups than in many "*wage-substitution businesses*" that will lead to public money waste.

Nevertheless, if the primary goal is to build an ecosystem, then the programme may need to fund companies that may not be likely to generate a significant return, as it can result in a larger and stronger ecosystem (Christiansen, 2009). After that, the high-quality growth strategy may be adopted.

Duration

The question about the most suitable duration for an acceleration programme is a very important one. As already stated, acceleration implies short periods of time (3-6 months), but how to decide what the best duration is?

For Christiansen (2009), programme duration or timeline should be long enough to enable startup founders to develop a demo product and a pitch.

Depending on the industry, time required before a true demo is ready can be shorter or longer (Christiansen, 2009). Corroborating, Barrehag et al. (2012) refer that with some accelerators, exit strategies might vary depending on the goals set for return on investment.

Educational Programmes

In regions without a strong history of entrepreneurship, educational programmes should be more comprehensive, while accelerators that focus on more experienced entrepreneurs could develop a more tailored educational programme. Despite this, product-specific advice and education should be included as a part of every accelerator programme, in order to promote the long-term success of ventures (Christiansen, 2009). According to Wright (2018), a key component of educational programmes is question and answer panels and discussion sessions on the relevance of the learning issues and startups survival.

The programme's focus choice is critical and a prior survey to the city or region resources and capabilities is needed before starting (Christiansen, 2009).

Networking and Alumni Relations

Since networking opportunities are usually one of the main reasons for entrepreneurs to apply for accelerators (Barrehag et al., 2012; Brown et al., 2019) and increase connections to the regional entrepreneurial ecosystem (Goswami et al., 2017), they should be considered as the opportunity for startups to work closely together in activities like workshops; joint learning activities or shared office space (Christiansen, 2009; Barrehag et al., 2012). This should be even more reinforced in niche accelerators, where peers advising is more implementable (Goswami et al., 2017).

At universities, alumni, professors, entrepreneurs in residence, teachers of entrepreneurship or coaches of entrepreneurial creativity and business plan development, should be engaged in the process, as they can facilitate the internal and external environment connection. Furthermore, alumni entrepreneurs may be involved to contribute to the ecosystem as mentors, coaches, investors or advisors, as they already became successful professionally (Wright et al., 2017)

Community Capital or Social Capital

Bliemel et al. (2019) highlight that to create a virtuous cycle within entrepreneurial ecosystem, accelerators must provide human, social, cultural, financial, political capital. Otherwise, the entire virtuous cycle could collapse, e.g., lack of seed capital can make entrepreneurs look out the ecosystem to find it.

A resource-rich environment can attract the best startups focusing on a specific industry or technology and may be attractive to stakeholders, as mentors, even at an early stage (Christiansen, 2009).

Metrics and Outcomes

While the acceleration process itself refers to “growth”, which can be on number of customers and revenues or team capacity and maturity, these goals are usually time-compressed (Shankar & Clausen, 2020) and depending on the goals of each accelerator programme, “success” may differ (Hochberg, 2016).

Dempwolf et al. (2014) argue that accelerator metrics should address participation, process and performance for four distinct constituencies: startups, activities, sponsors, and follow-on investors. Such metrics would allow for true comparisons across the various types, business models, industries and so forth. They may also help distinguish new accelerator models, as the market for accelerators continues to grow.

Crisan et al. (2019) present a series of cited outcomes that can be described as “soft” and “hard”. Network building, innovation enabling, entrepreneurship nurturing and promoting people’s tolerance to failure could be understood as the “soft” ones, and funding, market access, access to research facilities and exits could be described as the “hard” ones.

CONCLUSION

The reasons behind the implementation of an accelerator or an accelerator programme are related to IPStartUp management vision and to IPS mission. As a HEI, IPS is committed to enhancing knowledge and technology transfer to society, and IPStartUp must follow those premises, to get legitimacy and stakeholders’ credibility, which is essential to get their support (Pauwels et al., 2016).

The strategy followed by the incubator management regarding the implementation of an entrepreneurial ecosystem, both internal and external, seems to be in line with Isenberg (2010), as it uses all resources available and aims to achieve maximum growth, but at the same time delays it a bit by gathering more participants, while constructing a community.

The incubation model and its activities promote the creation of new and high-value, knowledge-based organizations, but the acceleration can increase growth, qualified employment creation and generate significant revenue, which has not been the case in the first years of the incubator implementation.

As the incubator achieved a steady credibility inside its mother institution, it is important to take the next steps towards growth and a next generation of ventures, supported by regional ecosystem stakeholders.

As a contribution for universities that intend to start their own accelerator, this study identifies ten main dimensions that ABI should reflect on before implementing their own acceleration programmes or associating with other accelerators. Table 4 sums up these dimensions, focusing on ABI perspectives.

All these dimensions are considered of the utmost importance, but dissemination and communication activities need to have a special consideration. No ABI is successful if teachers, students and graduates are not aware of its existence (Pinto et al., 2020) and for that matter neither is an acceleration programme or an accelerator. Due to the time and efforts it utilizes (Pinto et al., 2020) and having in mind that ABIs run on a non-profit basis, human resources might be difficult to allocate, so ABIs internal teams might have to be creative.

Soon, more studies are needed to understand the impact of acceleration programmes linked to ABIs. The diversity of outcomes that can be achieved must be clarified, so that comparisons are possible and HEI top management can take more informed decisions towards the investment in these support activities that are also part of their mission but lack the “numbers” to be evaluated.

Table 4. Dimensions for reflections under implementation decision for ABI accelerators

Strategy and Target Focus	Evaluate HEI and ABI policy focus
	Take into account regional stakeholders interests
Expertise	Rely on ABI directors expertise as well as on the mentors' network with a vision to improve it Select participants that fit best with that expertise Promote a culture of knowledge exchange
Branding	Invest on branding activities such as communication and dissemination that catalyzes visibility and credibility
Size	Evaluate the internal structure and facilities before defining the number of participants
Funding	Look for investor possibilities and evaluate own seed funds
	Depending on industry focus or not, specific stakeholders have to be involved
	Create rules for investment, according to desired goals and outcomes
Duration	While it should not be longer than 6 months, definitions about startups exit achievements will define the length of the programme
	Evaluate technology-base or not, as it will also define the length of the programme
Educational programmes	Entry evaluation criteria should be implemented so that tailored educational programmes are prepared
	A link to HEI and regional resources might be of assistance when designing such programmes
Networking and Alumni Relations	Evaluate facilities that can be used under acceleration
	Involve former founders and corporate mentors
	Put in place future actions, managed by the ABI, for networking activities
Community Capital or Social Capital	Be aware of the resource environment that can be assigned to acceleration activities as it can create either a virtuous cycle or a collapse
Metrics and Outcomes	Define what "success" means and the metrics to measure it
	Monitor accomplishments and involve stakeholders in growth and exit

Source: own elaboration

In the case of public HEIs, as its mission encompasses regional development, knowledge transfer and ecosystem building, the use of resources must be well demonstrated, both for stakeholders and for governmental authorities.

After the 2020 pandemic crisis, HEIs also need to look back on their procedures of incubation and acceleration and make assessments of the before and after pandemic impacts of their programmes. Evaluation may only be possible after a few years, but the decisions to be made regarding implementation should take into account the lessons learned in dealing with creativity and new ventures support during a period of pandemic crisis.

The implemented changes, as mentioned at IPStartUp procedures, must be evaluated in a few years in order to understand if they were completely discontinued or if they need to be understood and considered as part of the day-to-day jobs to be done, as already mentioned in this chapter. As a startup vision induces business incubators to act as learning organizations (Carvalho & Galina, 2015; Carvalho, Backx & Galina, 2019; Carvalho, Backx & Mine, 2020), the adjustment of processes and procedures may be seen not only as a consequence of the 2020 pandemic crisis, but also as the inevitable changing future.

Implementing Acceleration Programs

The main limitation in doing this study was the lack of data, because IPStartUp is a young incubator. Nevertheless, authors were granted access to all data available until now and to primary information, which allowed a more accurate study.

As for future research directions, besides the socioeconomic impact, outcomes and metrics definition previously referred to, studies about the network effect and success or failure case studies should be developed.

For HEIs to achieve a central role in the entrepreneurial ecosystem, they must be able to catalyse all the interactions and achievements and clearly demonstrate their value.

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KEY TERMS AND DEFINITIONS

Academic Business Incubators: Establish practical support for people connected with the entrepreneurship in the campus.

Business Accelerator: Is a programme that supports startups in the access to mentorship, investors and other support that help them become stable, self-sufficient businesses and grow.


Business Incubator: An organization designed to accelerate the growth and success of entrepreneurial companies through support in infrastructures, network, and services.

Incubatees: Free term indicating the entrepreneurial teams formally supported by the incubator.


Chapter 4

Industry 4.0: Why Industries Should Become More Digital in the Post-Pandemic Era – The KFactory Case Study

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ABSTRACT

This chapter aims to describe a research work in a real context, focusing on small industries and why they must become more digital, in order to create new and innovative business models and remain competitive in a post-COVID-19 scenario. It also aims to present the challenges small industries will face as a result of the digital revolution ahead, why they should reinvent their business models to be more prepared in the future, and why they should use the pandemic scenario as a lever to make this change faster and more agile. A qualitative methodology is used based on document analysis of use-case information collected from KFactory, a technological consulting startup that works with small industries and helps them identify opportunities and benefits in adopting Industry 4.0. The authors hope that the KFactory case study can contribute to a better understanding of how industries can benefit from technology to improve their production methods, adapt to a post-pandemic scenario, and engage in the new digital revolution.

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INTRODUCTION

According to the World Economic Forum (Schwab & Davis., 2018), the future of the Fourth Industrial Revolution is an important source of hope for human development, following the path of previous industrial revolutions that, since the mid-18th century, have resulted in dramatic improvements in the quality of life of millions of people, all over the planet.

Over the last decade, the proliferation of technologies such as intelligent connected devices, artificial intelligence, machine learning, cloud and edge computing, had led many industries to adopt a more digital strategy and, consequently, to adapt their business models accordingly. The fact that the technology is now more democratized, more accessible and also cheaper largely contributed to this effect. According to the Boston Consulting Group (2015), advances in technology based on Industry 4.0 will reshape the economic and business landscape by 2025, completely transforming the industrial workforce. And probably, the pandemic COVID-19 will have an accelerating role in this context.

But, as industry and businesses move forward, it is important to be aware that the Fourth Industrial Revolution represents several challenges, one of which is the concern with human values. It is therefore important that this “revolution” is centred on people and the development of their human capital. According to this view (Schwab & Davis, 2018), this means some challenges for current leaders, namely, to think not only on technology but mainly in systems that improve people’s productivity and well-being, and not forcing the use of technology but rather valuing and empower human decisions. The emergence of new technologies, such as those applied to robotics or artificial intelligence, can influence the behaviour of workers and be seen as “competitors” of their work, and that could be a tremendous challenge for the Industry 4.0 and for all stakeholders involved.

Resuming, different sectors in industry are facing the same challenges in the COVID-19 pandemic such as considerable drops in demand, materials shortages, workers unavailability and the adoption of telework (Agrawal, Dutta, Kelly & Millan, 2021). The word is to adapt quickly or... lose the race. And the transition to the Fourth Digital Revolution can help mitigate most of the current and future problems mentioned.

MANUFACTURING HISTORY

Producing various objects is old as mankind. Basically, every product realized by individuals or groups can be assimilated with a basic manufacturing process. During times, humans managed to manufacture objects for their own usage or for commercial purposes, into small workshops and using basic tools.

A first major shift came during the First Industrial Revolution (Industry 1.0) in the 18th century where, instead of items being produced by basic means, processes were invented and allowed items to be produced by machines. This began in England in mid-18th century, then finally reached the United States by the end of the 18th century. The First Industrial Revolution marked a shift from an agrarian and handicraft economy to one dominated by machinery and significantly impacted industries like mining, textiles, glass and agriculture (Schwab, 2016), mainly by combining cheap and abundant energy with equally cheap and abundant raw materials (Harari, 2011).

The dramatic reduction of material cost and production time impacted several industries including the textile industry. Prior to this period, textiles were mainly made in people’s homes and merchants would provide the basic equipment and materials needed. This meant workers would make their own schedules,

Industry 4.0

which made it difficult to regulate. Inventions as the steam engine, the spinning wheel, and the water wheel changed the face of manufacturing and set its path to an innovation that is present in our days.

Because the demand was greater than the supply, one major downside of those times it was the pressure on the lower working class. Until 1833, almost no standards existed for workers, which meant long hours and dangerous working conditions, especially for children. This led to the 1833 Factory Act, which placed restrictions on the working hours of children and set standards to protect workers (UK Parliament, 2021).

The next shift in manufacturing is the period between 1871 and 1914, known as the Second Industrial Revolution (or Industry 2.0), as result of extensive railroad and telegraph networks, which allowed for faster transfer of people and ideas (Engelman, 2015). The introduction of electricity allowed factories to develop modern production lines and adopt new, more competitive and innovative production models. As fact, the first assembly line was patented in 1901 by Ransom E. Olds, producer of Oldsmobile cars. His method allowed his company to produce 20 units per day, which eventually increased their output by 500 percent in one year (The Automotive Hall of Fame, 2021). As effect, Oldsmobile was creating more vehicles, allowing a drastic decrease of prices in the same time. The method used by Olds ended up serving as the model for Henry Ford which created his own system. Ford is now credited as the actual father of the assembly line as well as of automotive mass manufacturing (Ford Motor Company, 2021). Although the Second Industrial Revolution was considered a period of great economic growth, associated with an increase in the industry productivity in general, it was also the cause of a surge in unemployment and labour instability, since many factory workers were replaced by machines that performed the same tasks, faster and more efficiently (Jevons, 1931).

The Third Industrial Revolution, also known as the Digital Revolution (or Industry 3.0), began in the '70s in the 20th century through partial automation using memory-programmable controls and computers. The central point of this phase is the mass production and widespread use of digital logic, MOS transistors (metal–oxide–semiconductor field-effect transistor), integrated circuit chips and their derived technologies, including computers, microprocessors, digital cellular phones, and the Internet (Schwab, 2016). These technological innovations have transformed traditional production and business methods. Basically, it can be said that the digital revolution has converted technology that was previous analogue into a digital format. It is important to mention that Industry 3.0 is still present in most factories and in most production models around the world, with the same basic level of evolution.

INDUSTRY PRESENT AND FUTURE

Nowadays everybody relates to the Industry 4.0 or, as many academic authors call, The Fourth Industrial Revolution – a union between physical assets and advanced digital technologies – like the Internet of Things (IoT), Artificial Intelligence (AI), robots, drones, autonomous vehicles, 3D printing, cloud computing and other technologies, that are interconnected, having the possibility to communicate, analyse and act. Industry 4.0 originated in 2011 from a project in the high-tech strategy of the German government, which promotes the computerization of manufacturing (Büchi, Cugno & Castagnoli, 2020). Actually, the term “Industry 4.0” who was publicly introduced in the same year at the Hannover Fair (Matt & Rauch, 2020), is the transformation of so-called, traditional industries by combining the internet and the information and communication technologies – such as Internet of Things (IoT), big data and services – with traditional industrial processes (Kagermann, Anderl, Gausemeier, Schuh & Wahlster, 2016).

According to Hermann, Pentek & Otto (2016), the industry standards, four design principles for Industry 4.0 can be identifiable. These principles, despite being perfectly identified in several scientific literature, guiding professionals on how to adopt and apply Industry 4.0, it appears that it is in industry publications that many of these elements are discussed most frequently. Design principles can be described as:

- **Interconnection:** the possibility to put machines, devices, sensors and workers connected to each other, through common communication standards that allow flexible use of various technological tools from different vendors. It is also called the Internet of Everything (IoE), composed of Internet of Things (IoT) and Internet of People (IoP), connecting people, processes, data and things intelligently;
- **Information transparency:** comprehensive information to help make appropriate decisions is crucial and in Industry 4.0 it is more crucial than in other systems. The link between the physical and the digital world requires a new form of information transparency so that machines, sensors and people can share the same information and make decisions based on it. In this context, transparency but also availability and access to information are essential factors for the success of a connected and competitive economy (Plattform Industrie 4.0, 2019);
- **Decentralized decisions:** Industry 4.0 brings a new generation of integrated systems that combine physical and digital capabilities that allow companies to make better decisions and perform tasks with a high degree of autonomy, based on local and global information, in order to improve the entire decision process and boosting productivity growth;
- **Technical assistance:** it is important that workers on a factory can be assisted in decision-making and problem-solving situations. To achieve this, systems need to aggregate, visualize and understand information in a way that is comprehensive for people and that can be useful for them to make informed decisions and solve urgent or unsafe tasks.

Since 2011, when the German government put on the agenda the promotion of large-scale computerization of industry, the focus of many technological companies has been to include the newest technologies into their products and deliver Industry 4.0 principles into real production.

In fact, and according to “Industry 4.0 Market & Technologies 2018-2023” (Homeland Security Research Corporation, 2018), the technology market that supports the Fourth Industrial Revolution is dominated by companies like IBM, Microsoft, Alphabet (the parent company of Google), Samsung, NEC and others considered “technology giants”. The same report also states that “*the Industry 4.0 market will reach \$214B by 2023*” and “*is forecasted to reach \$1 trillion by 2030*”.

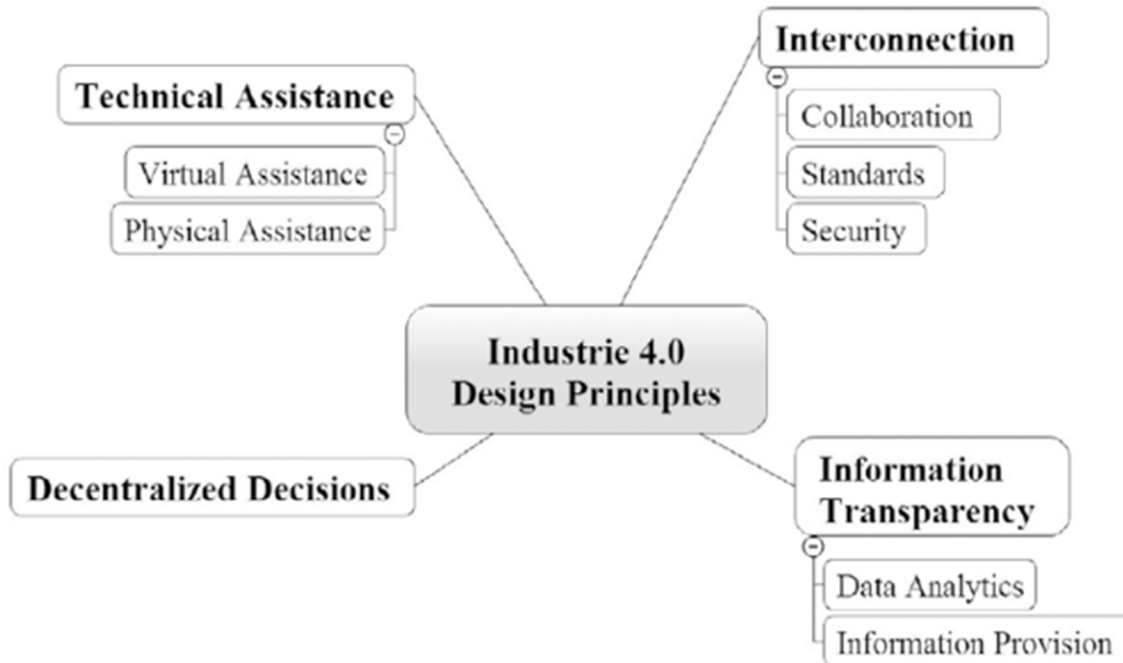
This scenario has contributed to an unprecedented evolution of new technologies, easy to adopt and integrate, with standardized architectures and information exchange formats, optimizing complex systems, resulting in a reduction in the time to create and launch new products (Kagermann et al., 2016).

Although industries and factories have benefited from this evolution, the focus has been to investing in the digital revenue growth, instead of efficiency and productivity gains (Geissbauer, Vedso & Schrauf, 2016). For example, for some years after 2011, Industry 4.0 solutions struggled to gain traction in the market, mainly because manufacturing companies where been reluctant to change their production processes. This is a scenario that is found mainly in emerging economies, represented by countries historically more focused on the extraction and commercialization of commodities, which results in a significant delay in the implementation of digitization strategies and the adoption of new technologies (Dalenogare, Benitez, Ayala, & Frank, 2018).

Industry 4.0

Figure 1. Design Principles of Industry 4.0

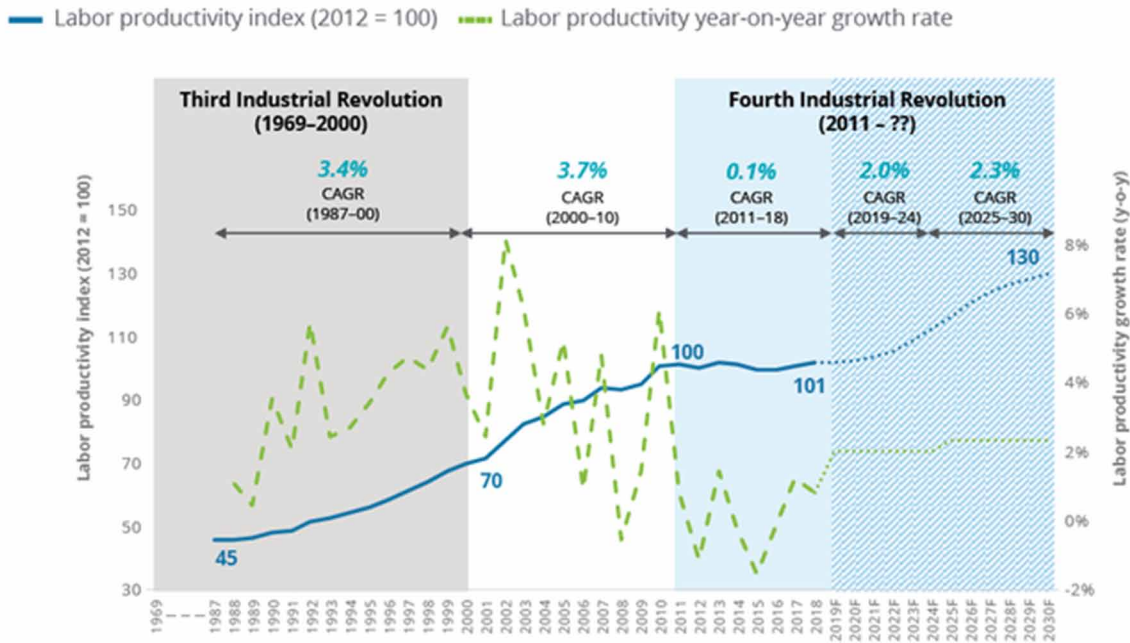
Source: Hermann, Pentek & Otto (2016).



The industrial and manufacturing sector worldwide is still looking for a path that balances the improvement in current operations and processes with the opportunities offered by the technologies of Industry 4.0, not just in terms of innovation but also in terms of pivoting current business models (Daecher, Sniderman, Holdowsky, Cotteleer, Mahto, Hanley, Murphy & Rutgers, 2018). According to industry reports, studies indicate that labour productivity worldwide appears to have stagnated in recent years. Between 2007 and 2018, productivity grew below 1%, as opposed to the average annual growth rate of 3,6% between 1987 and 2006 (Wellener, Shepley, Dollar, Laaper, Manolian & Beckoff, 2019). This can be explained by the simple fact that factories are leveraging their productivity models according to the number of hours worked by people. This affects economies and diverts them from the course of the past decades, as shown in the following figure.

But talking about smart factories as the ideal and unique path for an innovative industrial economy may not be taken as an obvious one. This is mainly because the adoption of Industry 4.0 by current companies requires significant changes in terms of internal processes (Dalenogare, Benitez, Ayala, & Frank, 2018), relationships with stakeholders (customers, suppliers, etc.) and even in terms of business models. Many companies, especially Small and Medium Enterprises, are not prepared to deal with radical innovations such as those proposed by the Fourth Industrial Revolution (Orzes, Poklemba & Towner, 2020). Many authors consider this to be a main barrier (along with financial barriers) to the adoption of technologies and processes offered by Industry 4.0 (Masood & Sonntag, 2020). For many companies, the cost of change could be higher than the innovation benefits (Dalenogare, Benitez, Ayala, & Frank, 2018).

Figure 2. U.S. Manufacturing Labor Productivity, Forecast, 1987-2030 (2012 Index = 100)
 Source: U.S. Bureau of Labor Statistics, Deloitte & MAPI (2019)



Taking into account the market and the adoption of the smart factory concept, the Deloitte’s Research Center for Energy and Industrials and the Manufacturer’s Alliance for Productivity and Innovation (MAPI), based on data from United States and global manufacturing companies, estimated that in the next ten years there will be two phases on Industry 4.0 evolution: between 2019 and 2024, a slower phase will be observed, then between 2025 and 2030, it is expected a significant growth, the result of an acceleration of new technologies adoption of smart factories (Wellener et al., 2019).

The numbers are based on studies that estimates that more than 85 percent of manufacturing decision makers believe that “*smart factory initiatives will be the main driver of manufacturing competitiveness in the following five years*”, as shown in the following figure.

INDUSTRIES AND THE POST-COVID ERA

Since December 2019, the world changed. A pandemic was on the horizon and, in a few months, the infectious agent “Severe Acute Respiratory Syndrome Coronavirus Type 2” (SARS-CoV-2), responsible for the transmissible disease, known as “Coronavirus Disease 2019” (or COVID-19), spread all over the world putting people, public health and economies in all countries in severe risk. The global economy entered a historic and unprecedented contraction in per capita income. Studies forecast that the global contraction of GDP in 2020 will be 5,2%, plunging most countries into severe recessionary crises, with a historic fall in per capita income never seen since 1870 (World Bank, 2021).

Industry 4.0

Figure 3. Importance of Smart Factory Initiatives in the Perspective of Manufacturers

Source: Deloitte & MAPI (2019)

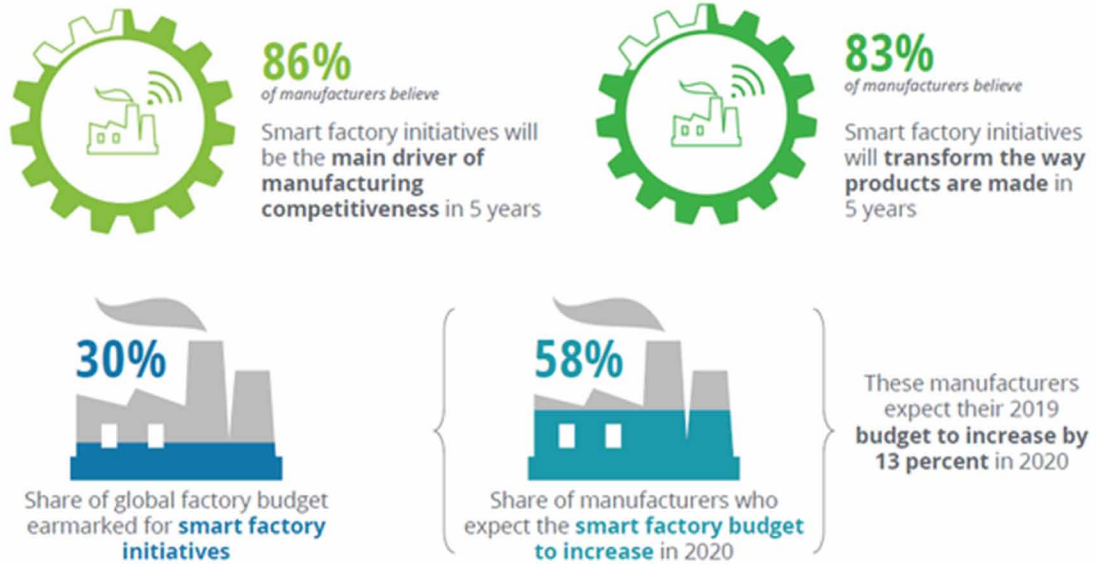
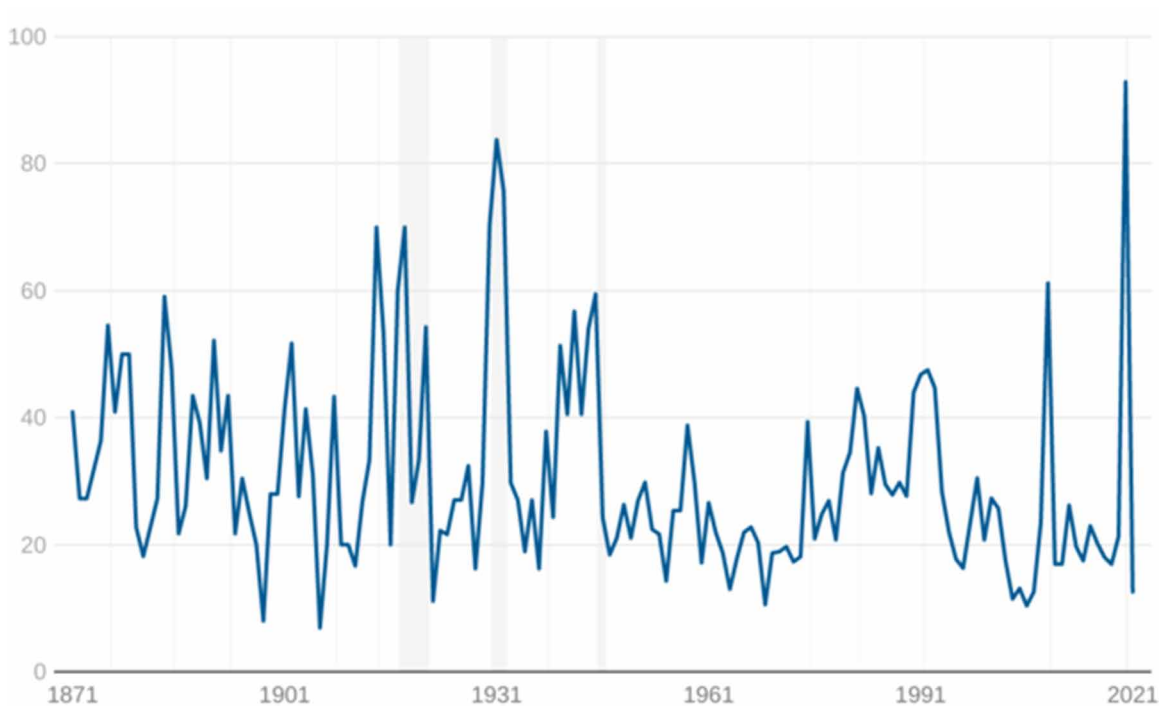


Figure 4. Share of Economies in Recession, 1871-2021

Source: World Bank (2020).



With a scenario of long-term damage to GDP and productivity, in 2021 and in the years to come, most economic sectors will be affected, with no exceptions, including manufacturing companies and industry in general. (World Bank, 2021). Mostly innovative small and medium-sized enterprises and early-stage startups (OECD, 2021). However, there will be some industries that will be less affected than others, depending on the country where they operate but also on the competitiveness of the sector and the capacity for innovation and investment, and that is an important opportunity to invest in digital business models based on Industry 4 (Plattform Industrie 4.0, 2020).

As the SARS-CoV-2 virus pandemic crisis advances, many organizations are forced to rethink and reflect on their operational strategies, making agility and flexibility top priorities for processes (Agrawal, Dutta, Kelly & Millan, 2021). So, how can industries survive in a post-pandemic scenario and how can they adapt their business models to digitalization and Industry 4.0 as the way to become more competitive?

Propositions such as those presented by the Working Group “Digital Business Models” of the *Plattform Industrie 4.0* group (2020), supported by the German Federal Ministry for Economic Affairs and Energy, can serve as guidelines for the industrial sector but also as a basis for a possible framework for the implementation of Industry 4.0 in a post-COVID-19 scenario. The document, named “Ten Propositions on the Future of Digital Business Models for Industrie 4.0 in the Post-Corona Economy”, lists the following propositions:

1. Boost for digitalization and digital business models, but also clear demand for scalable digital infrastructures and high-performance communication networks are becoming increasingly important;
2. Flexibility and agility become the basis of competitiveness;
3. Resilience of value networks as a new business case;
4. Localization of manufacturing demands adaptation of product and process architectures;
5. New ecosystems and marketplaces are emerging;
6. Innovative revenue models are getting traction;
7. Competence requirements are changing radically;
8. “Physical distancing” of production: Remote services increase importance;
9. Flexibilization of work fosters new forms of organizing and learning;
10. Industry 4.0 as enabler for sustainability.

Analysing the proposals presented in this document and summarizing its content, we can highlight the following:

The pandemic crisis has put many people and companies in complete (or partial) lockdown, which has forced many businesses to look for ways to incorporate digital services and operations more quickly, which gave a tremendous boost in the race to digitalization. With the massive adoption of digital services by organizations, several challenges are posed to industries that should be seen as opportunities (and not as threats). Investing in high-performance infrastructures and scalable communication networks should be a priority, as well as investing in training workers in digital tools and processes in order to reduce adoption barriers for the new digital models. In the authors’ perspective, the concept of “home office” will remain as a part of the work organization and manufacturing companies must be prepared to include more remote and predictive services in their operating models. The training of workers and managers must also follow the path of digitalization, with the increasing adoption of digital learning tools and the need for people to obtain new digital knowledge and skills.

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Another interesting concept that we can observe in these proposals is the concept of “Manufacturing-as-a-Service”, where the emergence of more local and decentralized production, through the emergence of new production ecosystems and new marketplaces (partly due to the disruption caused by the crisis in global supply chains), will lead to new, less complex, business models and where the adoption of Industry 4.0 technologies will be crucial for the execution of these strategies.

According to the authors of this document, Industry 4.0 will allow manufacturing organizations to become more flexible, more agile, more competitive and more sustainable, optimizing processes and resources in an industrial sector highly affected by the pandemic crisis that may now have the opportunity to enter the Fourth Industrial Revolution, adapting its business models to new digital technologies and modernizing its production.

Finally, another relevant question is related to sustainability and how Industry 4.0 can contribute to resource efficiency and economic development (Ghobakhloo, 2020). The pandemic could also influence important changes in the way industries see sustainability at different levels: environmental, economic and social.

METHODOLOGY

The KFactory case study, which will be presented in this next topic, is an empirical exploratory case study that intends to demonstrate some of the assumptions described in the current chapter, identify best practices and explain how the implementation of Industry 4.0 instruments in two manufacturing companies improved their production processes. The two companies that served as the basis for the KFactory case study will be designated by G and C, both of which are well-known Romanian companies but, due to confidentiality agreements, their real names are not revealed. In terms of literature review, the authors based themselves on recent publications, mostly on industry publications and studies related to the Industry 4.0.

THE KFACTORY CASE STUDY

All About Performance in Manufacturing

The startup KFactory, operating since June 2020, is the first Industry 4.0 digital platform founded in Romania, implementing an ecosystem of solutions for Smart Factories for companies operating in the European Union (EU) market. Composed by a team with high knowledge and skills in IT and manufacturing, KFactory saw an opportunity to turn factories into smart factories. They position themselves as a company in the first wave of startups that changed the manufacturing industry by reinventing the operational processes, using the technology and innovating the core process specific in all sub-sectors, particularly in performance management of production line, considered the most important issue for manufacturing CEOs.

KFactory mission is “*democratize the access to internal data by removing the existing knowledge barriers inside a factory*” (KFactory, 2021).

In the word of KFactory co-founders (KFactory, 2021):

- *We know manufacturing and IT: That's why we see not only the directly recorded data, but also the context info and events, gaining deep knowledge on operational processes.*
- *We translate technology into business: Manufacturers need help to understand digital technologies. We have the expertise to make a smooth transition from the status quo to an advanced digitalized environment.*

The KFactory system is capable of signaling in advance the possibility of production incidents, whether technical, supply, maintenance or quality. It is a flexible and intelligent solution that provides decision makers and managers with a clear picture of performance, resource utilization and efficiency.

The KFactory process begins with the identification of several operational issues in factories. Among the various problems that are identifiable, there are ten that the KFactory team identifies as the most common:

1. Data collection is manual or is not working as it should;
2. Decisions are difficult to make because the events are not visible in real time;
3. Human actions substantially affect the production process;
4. The performance of the production line is not high enough;
5. Processes such as maintenance, quality and supply chain need to be improved;
6. The factory has a complex IT scenario, with multiple data sources;
7. Advanced IT solutions are used, but context analysis is complicated;
8. Long and exhausting meetings are often necessary to understand the cause of problems;
9. Entire teams struggle with data aggregation and report consolidation;
10. Data is isolated within departments and is not used in the daily decision-making process.

In order to respond to these limitations, KFactory started with a product dedicated to data collection and analysis. No digital process is possible without data, so the first step is always to collect data. By automating it, KFactory assures customers that data does not change during the process. The platform has evolved over time based on four main components:

- **KFactory Core:** that collects data from various sources and actors, and understands the process, showing weak points;
- **Analytics:** a business intelligence tool that wraps up historical data, correlations, trends and patterns, but also problems, delivering a clear view over factory performance;
- **Machine Learning:** dedicated to predictive performance and predictive maintenance by learning from actual data;
- **Engineers Virtual Team:** a unique solution that allows operational personnel from factories to interact with data and internal processes using Microsoft Teams.

The various KFactory components are:

1. Managing the issues with dedicated functionalities like automated data collection from industrial equipment;
2. Real time notifications on multiple channels;
3. Dedicated analytics engine.

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This allows managers to understand their companies' production information, access performance data, stop reasons, contexts and trends, and make data-based decisions and seamless integration with other IT solutions in the IT landscape.

Figure 5. Equipment Monitoring

Source: KFactory (2020)



Data Driven Decisions Based on KFactory

A good example of how KFactory is helping its customers to solve operational problems is the implementation in G, a Romanian industrial group formed by a joint venture with a French manufacturer with 17 factories around the world. It holds an annual turnover of 70 million euro and around 700 employees working in a 24/7 regime. G customers are automotive companies, spread around all continents, but 70% of its production is for its biggest customer: Dacia-Renault group.

The challenges of G in production were multiple:

- No visibility of the production process. The operators wrote down the evolution of the shift (reasons for the stop and parts made) on the paper and then, a data collection team introduced the data into Excel. Reports were usually available for management within 1-2 weeks of the time of production, making any analysis late and ineffective;

- Whenever operators encountered problems, they expected a manager to come by and announce the problem, or they were leaving the workplace and starting to look for those responsible for the factory;
- Due to incomplete and late reports, improvement decisions were almost impossible. In addition, the entire chain dependent on the production cycle was ineffective, including maintenance, quality, supply chain and commercial.

The G management estimated a loss of revenue of around 1 million euros per year due to the cumulative effect of operational challenges.

KFactory started roll-out with two industrial presses as a pilot project. The first objectives were to read the data accurately and accommodate operators to the application's workflow. After six months of pilot project, due to the good results, G management decided to extend KFactory to 8 more industrial presses. Today, KFactory is used in 45 industrial equipment in G, including industrial presses, welding machines and robots.

As a result of the KFactory implementations, the production flow in G has been optimized, as explained below:

- Operators are interacting with the K Factory mobile application on a tablet next to the industrial equipment (Figure 6), giving inputs on projects or reasons for stopping;
- The tablets automatically read the sensors of the equipment, showing the production carried out in real time;
- When the reasons for stoppage involving support teams (e.g. quality, maintenance) are raised, KFactory automatically sends notifications by SMS or Microsoft Teams to those responsible. In this way, the entire support process is monitored, from the moment a notification is sent, until the moment is received;
- Data is available in real time to all managers in the form of a comprehensive dashboard (Figure 7);
- Reports are sent by e-mail a few minutes after the end of the shift, ensuring instant production analysis;
- By integrating a business analytics platform, G managers have access to all data, production trends and patterns, allowing them to take the right decisions.

The following, year after the launch of KFactory implementation, the measured results were impressive:

- The overall performance of the production process has been increased by 15%;
- For a part of industrial equipment, growth was even greater, up to 25%;
- KFactory triggered important decisions at the shop floor level, such as replacing three industrial presses that did not perform as required;
- The data collection team was reallocated to other activities;
- KFactory is still launching new features for G, adding more value to this customer in the coming months and years.

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Figure 6. Plant Operator Managing KFactory Tablet
Source: KFactory (2020)

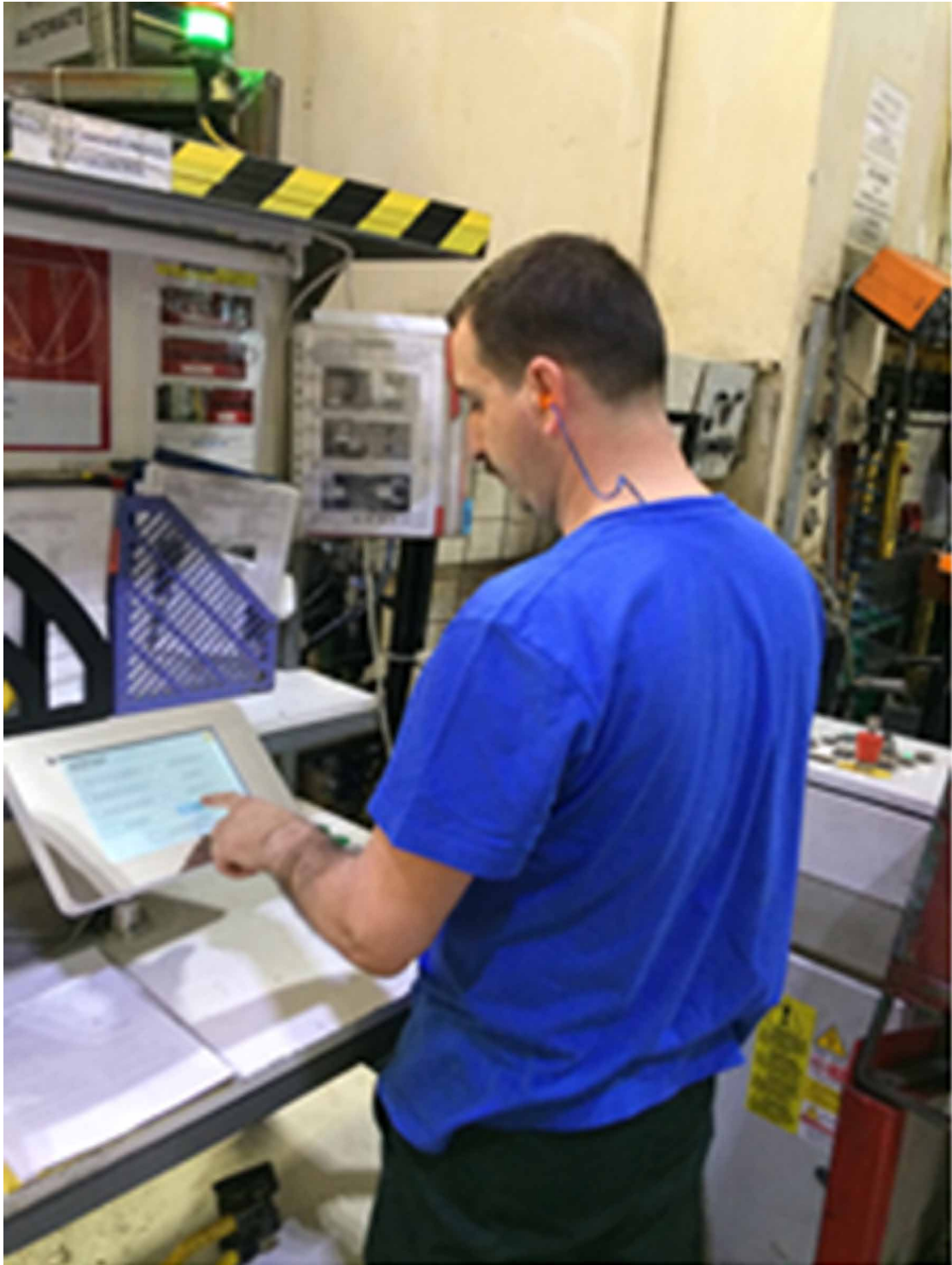
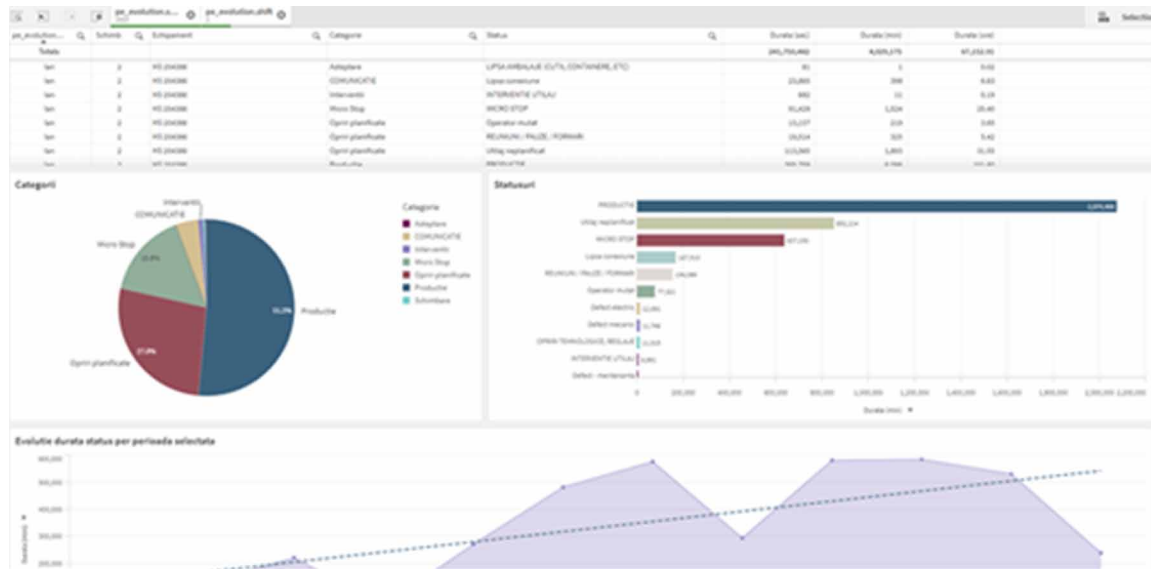


Figure 7. Sample of a Data Report from KFactory Systems
Source: KFactory (2020)



From Manual Data Collection to Operational Excellence

Another example of a successful customer is C. With more than forty years of experience in the automotive industry, C is a well-known Romanian producer in the original equipment market (OEM), designing, developing and manufacturing parts and assemblies, including spare parts.

When KFactory took over the C project, it faced a situation very similar to that found in G:

- Data collection was done manually;
- All reporting activity was based on Excel files, which were prepared by a dedicated team of three people;
- Reports arrived late to decision makers and with inaccurate information.

Basically, no critical decision could be made without data. This meant loss of profit and constant operational problems related to maintenance and quality.

KFactory started with a pilot project on eight industrial equipment: six CNC and two cutting machines. The initial objectives were to calibrate the data collection of the equipment and then to get operators to familiarize themselves with the KFactory system. After six months, C management decided to extend KFactory for all industrial equipment: fifty eight machines in total. The benefits of extending the service were recognized by the C management, the most important of which are:

- The overall performance of the production process constantly increased to 10% after one year of implementation;
- Real-time data is displayed, in various locations throughout the factory, on easy-to-read dashboards, via smartTVs (Figure 8);

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- The data collection team was relocated to other activities;
- C management is now defining new production strategies based on KFactory data.

Figure 8. Smart TV Projecting Real Time Data

Source: KFactory (2020)



In conclusion, this case study presented four fundamental advantages for customers C and G using KFactory Industry 4.0 technologies, which the authors would like to highlight:

1. Ensuring that crucial information does not change throughout the manufacturing process. This is achieved by automating data collections;
2. Be able to make more informed decisions based on proprietary data;
3. Workers become increasingly more accustomed to the technology and managers more aware of its benefits for their business strategy, making digital solutions part of the day-to-day activities;
4. Achieving excellence supported by fully digital and fully controlled processes, allowing to continuously improve production and manufacturing.

REFLECTIONS FOR A FUTURE STUDY

The implementation of KFactory solutions in companies C and G, presented in this case study, took place during 2019 and 2020. Since the pandemic is still going on by the time this chapter is concluded, the

authors did not have the opportunity to carry out an analysis of the results and compare the performance of companies C and G in the periods before, during and after COVID-19. Also, the concept of Industry 4.0 is still difficult to measure, particularly among European Union countries, as there seems to be no closed definition of the term “Industry 4.0” (Castelo-Branco, Cruz-Jesus & Oliveira, 2019).

In this way, the authors leave as a reflection for future study, to analyse the impact that the pandemic may have had on the productive capacity of those organizations and to measure the usefulness of the systems based on Industry 4.0 technology. It would be interesting to observe how these systems contributed to minimize (or not) the damage caused by the pandemic on their productive activities. Including, in a future study, more manufacturing companies that have invested in Industry 4.0 technology in the past few years would also provide a more comprehensive view of the impacts of COVID-19 on the industrial sector.

CONCLUSION

It is difficult, not to say impossible, to imagine a future where industries do not invest in digital technology as a way of becoming more competitive and efficient (Vaidya, Ambad & Bhosle, 2018). Although it is still a recent phenomenon and rarely implemented by companies (Büchi, Cugno & Castagnoli, 2020), those that adopt Industry 4.0 earlier will become more flexible, responsive and intelligent, therefore more prepared for data-driven decisions (Castelo-Branco, Cruz-Jesus & Oliveira, 2019), as demonstrated in the K-Factory case study.

But, although the digital transformation is bringing profound benefits to people and businesses, an ongoing path to digitization is bringing some complex challenges also, such as the need for workers with skills in more technological areas to the detriment of others, less qualified and with less competence to work in a digital environment, like a smart factory (Brynjolfsson & McAfee, 2016). People with skills in the fields of data science, data analytics, IoT or artificial intelligence will be on the priority list of many companies (Agrawal et al., 2021) and the focus will be on working with smaller, more agile, multidisciplinary teams through fast and interactive processes (Handscorn, Mahadevan, Schor, Sieberer, Naidoo & Srinivasan, 2020).

Therefore, a question needs to be answered: will the COVID-19 pandemic be an engine of change and acceleration in the Industry 4.0 paradigm and for small and medium-sized companies? The data collected and analysed both in the literature review and in the case study, point to this being the way to go. Industries and tech companies are starting to embrace and develop more Industry 4.0 technologies, despite the slow rate of adoption by the manufacturing sector since 2011. A survey conducted in 2020 by McKinsey under the subject Industry 4.0, that included around four hundred global manufacturing companies, concluded that more than 90 percent of the companies’ leaders affirmed that “*Industry 4.0 had helped them to keep their operations running during the crisis, and 56 percent said these technologies had been critical to their crisis responses*”.

The awareness that the value added by new technologies will boost productivity and profits has contributed to empower the adoption of more digital systems in factories. Also, the adoption of technologies such as cloud-based applications, artificial intelligence, data analytics and smart devices (Vaidya, Ambad & Bhosle, 2018), can change radically business models and help a sector, such as industry (which has always been an important engine for the progress of economies) to be better prepared for the challenges ahead (Deloitte AG, 2015).

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Chapter 5

Socially Responsible Buyers' Online Trust on the Website and Their Level of Satisfaction

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ABSTRACT

The study focuses on a sample of 663 socially responsible online consumers from the Sonora, Baja California, and Sinaloa regions in Mexico. For the data collection, it was carried out during the months of April to August 2020, and an online questionnaire was used addressed to each of the residents of these regions between the ages of 20 and 55 and who are economically active. The objective of this manuscript is 1) to identify the effect that the website has on socially responsible buyers and their level of satisfaction; 2) to identify if socially responsible buyers have an effect on customer satisfaction; 3) on the other hand, to demonstrate if the buyer experience has a moderating effect between website security and socially responsible buyers; and 4) verify if the buyer experience has a moderating effect between socially responsible buyers and the level of customer satisfaction.

INTRODUCTION

Buying behavior is one of the most studied topics in the psychology and marketing literature since the last century. This is due to the relevance and significance of this type of analysis in both sectors. In a traditional way, individuals have different behaviors and attitudes that lead them to make decisions, in this case, in the purchase of a product or service (Ajzen, 1991; Sahu et al., 2020). However, today, consumers experiment with new ways and different tools that lead them to make decisions in a more hasty and unplanned way (Ajzen, 2011). These new experiences are related to the new ways of executing promotional campaigns by companies. Which base their resources and capabilities on the use of new technologies to influence the decision-making of buyers (Al-Qirim, 2007; Monsuwé et al., 2004). This has given rise to the so-called online consumers, who acquire products and/or services from companies that sell through different technological platforms such as websites and social networks (Kulviwat et

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al., 2007). For this reason, companies must offer consumers broad security and accessibility to their different technological platforms related to electronic commerce (e-commerce) to carry out online sales (Bt Mohd & Zaaba, 2019; Chang et al., 2016). These actions allow the online consumer to improve the level of satisfaction and elevate their shopping experience. With the increase in internet transactions derived from e-commerce, the theory of planned behavior (TPB) (Ajzen, 1991), the behavioral reasoning theory (BRT) (Sahu et al., 2020) and the technological adaptation model (TAM) (DeLone & McLean, 2004), indicate that consumers have evolved and increased their level demanding, both from the point of view of benefits and from the point of view of adaptability in the use of technology. But also, the economic, political, social and health changes have driven the growth of new consumers called socially responsible buyers. These types of consumers have high ethical, social and environmental demands from the brands they consume and, therefore, the image and reputation of the websites of these companies become determining factors to meet expectations and the level of satisfaction (Ocampo et al., 2014). The objective of this manuscript is: 1) to identify the effect that the website has on socially responsible buyers and on their level of satisfaction, 2) to identify if socially responsible buyers have an effect on customer satisfaction, 3) On the other hand, demonstrate if the shopping experience has a moderating effect between website security and socially responsible buyers, and 4) verify if the buyer experience has a moderating effect between socially responsible buyers and the level of customer satisfaction. This study has an important theoretical and empirical contribution, because in the Latin American context and in an emerging economy this type of analysis during the time of the Covid-19 pandemic, represents an important contribution to the development of the consumer behavior literature and technological adaptation. This shows that there are socially responsible consumers in this region and that e-commerce has penetrated significantly. This manuscript also contains the introduction, the literature review, the development of hypotheses, the methodology (sample and description of variables), the main findings, the conclusions and the discussions (future lines of research and study limitations).

BACKGROUND: LITERATURE REVIEW AND HYPOTHESIS

The theory of full behavior is based on the analysis of the attitudes and behaviors of the individual in the face of a particular phenomenon. At present this theory is one of the most used in the context of consumer behavior (Ajzen, 2011; Downes, 2013). The TPB, from the conceptual point of view, integrates three types of intentions independently. The attitude towards behavior is the degree to which a person has a favorable or unfavorable assessment of behavior on the phenomenon under analysis. The second is the social factor, which is called subjective norm, this encompasses the perceived social pressure to perform or not perform the behavior, and finally, there is the antecedent of intention that emphasizes the level of behavioral control perceived that is related to past events, refers to the perceived ease or difficulty of the behavior and reflects the experience to face obstacles in the present (Ajzen, 1991; Downes, 2013). Therefore, these conceptual considerations have a significant effect on consumer behavior, this is due to the fact that the relative importance of attitude, subjective norm and perceived behavioral control, has variations of behaviors according to real situations of the individual (Ajzen, 2011). On the other hand, the phenomena under study have focused on arguments derived from the behavioral reasoning theory (BRT), a new theory in the field of marketing that tries to link attitudes, beliefs, behaviors, reasoning and subjective norms in favor and against with regarding the consumer's purchasing intentions (Gupta & Arora, 2017; Talwar et al., 2020; Westaby, 2005). These theories are linked to the technology acceptance

model focused on measuring the utility and ease perceived by the user when making an online purchase (e-commerce) through different electronic devices, both fixed (desktop computer) and laptop, electronic tablet and smartphone (e-mobile).

Company Website Security and Socially Responsible Buyers

In the literature there is a wide variety of models that analyze information systems and their impact on purchasing behavior. One of the pioneering models in this field of action is that of DeLone & McLean (2004), in which they consider quality factors, the use, the benefits and the security of information systems as key pieces to satisfy the needs of consumers. Derived from these contributions, the technological adaptation model (TAM) arises, which considers ease of use and utility perceived by the consumer (Venkatesh & Davis, 2000), being one of the most widely used theoretical models to measure online consumer satisfaction (Y. Lee et al., 2003). Technological changes and a greater dependence on the internet have been shaping the buying behavior of consumers, this is forcing most companies to develop electronic commerce through the establishment of virtual stores or online. (Al-Qirim, 2007; Kulviwat et al., 2007). However, one of the determining elements to achieve trust and reputation is the correct use of computer media and systems by businesses to provide high security (Blut, 2016; Bt Mohd & Zaaba, 2019). The TAM model and other models focused on customer satisfaction have tried to cover the following aspects in e-commerce or, more recently, commerce through mobile (e-mobile) (Blut, 2016; Rita et al., 2019). These aspects focus on compliance, customer service, and consumer security (privacy) (Blut, 2016). Therefore, the security of the website, the quality of the website, the satisfaction of online consumers and the ability to learn are and will continue to be determining factors in the analysis of purchasing behavior (Bt Mohd & Zaaba, 2019; Hasan et al., 2012).

New business models and social and environmental changes have led to the emergence of consumers oriented towards social responsibility (Kukar-Kinney et al., 2016). Therefore, many consumers are evaluating the sustainable practices that businesses are developing in order to make a purchase decision based on values and morals (Limbu et al., 2012). Some researchers have expressed that the safety and reputation of the website is decisive for the purchasing intentions of the responsible consumer (Limbu et al., 2012). However, other studies point out that socially responsible consumers perceive a greater risk for buying online and there is little confidence in the security of the website (Jiyoung Kim & Lennon, 2013). In more recent studies, researchers have shown that the behaviors of socially responsible online consumers are drastically changing and relying on online shopping, this is due to the emergence of new platforms to carry out electronic commerce such as collaborative e-commerce, the pickup mode, and the use of social media (Facebook and WhatsApp), online sales channels that are linked to the business website (Hurlburt, 2012; Odusanya et al., 2020; Pernot, 2020). These strategies have been a key element in promoting online purchases by responsible consumers, encouraging the purchase of ecological, economical, recyclable and sustainable products, mainly due to the social influence of communities that have already had the experience with online shopping (Oláh et al., 2018; Wang et al., 2019). With the theoretical context and empirical argumentation, the following research hypotheses are proposed:

Hypothesis One: H1. The security of the company's website has a significant influence on the online transactions carried out by socially responsible buyers.

Company Website Security and Consumer Satisfaction

In the literature there is a great variety of theories and models that analyze the phenomenon of e-commerce through companies' websites, with the TAM and BRT models being the most used and being central elements that link the security of a company website with consumer satisfaction (Bt Mohd & Zaaba, 2019). Studies in this context, such as those made by Rita et al. (2019), concluded that overall consumer satisfaction with online commerce is significantly affected by the security and trust that a website provides. Other studies have shown that with the growth of commerce through the so-called e-mobile, online consumers are on the rise, but losing the privacy of their personal data (Cheah et al., 2020), but in other cases increasing its level of use and confidence (Chi, 2018). In another direction, it has been observed that the purchases made through the desktop computer and/or Laptop, consumers have greater confidence and security in the use of websites to make an online purchase (Sia et al., 2017; Zhu et al., 2020). Elements that measure the quality of the design, the security and the usability of the websites are being the key piece to raise the satisfaction of the majority of the consumers are online, and that also directly affects the intentions of future purchases (Chang et al., 2016; Chen et al., 2014). From the theoretical context and empirical argumentation, the following research hypothesis is proposed:

Hypothesis Two: H2. Increased security of the companies' website drives a greater increase in online buyer satisfaction.

Socially Responsible Buyer and Consumer Satisfaction

Responsible consumers at a global level have similar behaviors and also seek homogeneous motivations that satisfy basic needs; however, attitudes are affected by the social, political and economic context (Ellen et al., 1991; Özçağlar-Toulouse, 2009). From an organizational point of view, companies are adopting sustainable practices that lead them to gain market, reputation and raise the expectations of their consumers (Ingenbleek et al., 2015). On the other hand, from the point of view of consumers, buyers named as socially responsible are emerging more frequently (Kim et al., 2020). Various studies have tried to explain that socially responsible consumers have a higher level of satisfaction when they make their purchases in companies with good social, economic and environmental practices (Swaen & Chumpitaz, 2008). Other studies have argued that socially responsible buyers are looking for green products and reputable brands (Becchetti et al., 2020; He & Harris, 2020). In addition, socially responsible consumers have an ethical and altruistic behavior, this derived from the responsible purchases they make in sustainable companies and which in turn, positively affect their purchase intentions and the level of satisfaction (Fazal-e-Hasan et al., 2018; Panda et al., 2020). Therefore, when these consumers have negative experiences with their online purchases, their recommendations towards other potential consumers become a key factor in their purchase intentions and satisfaction levels (Junghyun Kim & Park, 2020; Yuan et al., 2020). However, other studies that associate the level of satisfaction with responsible online buyers are derived from behaviors related to fear and religiosity, practices that lead them to be environmentally friendly and responsible individuals (Rahimah et al., 2020). From the theoretical context and empirical argumentation, the following research hypothesis is proposed:

Hypothesis Three: H3. An increase in socially responsible online purchases generates greater purchase satisfaction.

The Socially Responsible Buyer Experience and Customer Satisfaction

One of the key factors in measuring the use and perceived benefit of online shoppers is satisfaction with their shopping experience. This indicator has become the central axis of e-commerce and modern marketing strategies. Therefore, the experience on a website is determined by the tangible and intangible elements such as: the security of the website, the functionality, the ease of use, the design, the type of products or services, the prices, the reputation of the brand, sensations and emotions, decisions affect the level of consumer satisfaction. The study developed by Constantinides (2004), on the experience of online shopping, informs that the functionality of the website that includes elements related to the usability of the site and interactivity; psychological elements aimed at reducing customer uncertainty by communicating the trust and credibility of the online and website provider; and content elements, including aesthetic aspects of the online presentation and marketing mix. In this same direction, other studies point out that the perceived value such as innovation, technology and the perceived risk as the interaction and effective communication between buyer and seller are the determining factors for cultivating online customer satisfaction (Yang et al., 2020). On the other hand, in the studies developed by Javed & Wu (2020) and Robina-Ramírez et al. (2020), it is observed that the recommendations of other online consumers have been the experiences with the greatest recurrence by socially responsible consumers, in addition to the trust of the website, the guarantees and the refunds, with it companies manage to positively influence the level of satisfaction. From the theoretical and empirical review, the following hypothetical approaches are structured (see Figure 1):

Hypothesis Four: H4. The online shopping experience has a moderating effect between the security of the website and the socially responsible buyer.

Hypothesis Five: H5. The online shopping experience has a moderating effect between the socially responsible buyer and their level of satisfaction.

METHODOLOGY

Population and Sample

The research study is cross-sectional quantitative and explanatory. The subjects participating in the study have been analyzed under the principles of stratified sampling. The population under study has been selected according to the following criteria: 1) access to Internet connectivity, 2) online shopping experience, 3) place of residence, 4) economically active population, and 5) age. The study was developed in the regions of Sonora, Baja California and Sinaloa in Mexico. In this region there is an economically active population of 2,485,823 between 20 and 55 years of age (INEGI, 2019). Of this population, 70% have access to the internet (Mexican Internet Association, 2019). To determine the sample, the probability in favor of 50% and against 50%, a confidence level of 95% and an estimation error of 3.8% were considered. The total sample of this study is 663 people who responded to an online survey, which was applied through google forms during the strongest months of confinement caused by the COVID-19 pandemic (from April to the month of August 2020). 45% corresponds to resident consumers in the Sonora region, 35% corresponds to resident consumers in the Baja California region and 20% corresponds to consumers residing in the Sinaloa region in Mexico. In Table 1 and 2 the characteristics of the study subjects can be observed.

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Figure 1. Theoretical model

Source: Own elaboration

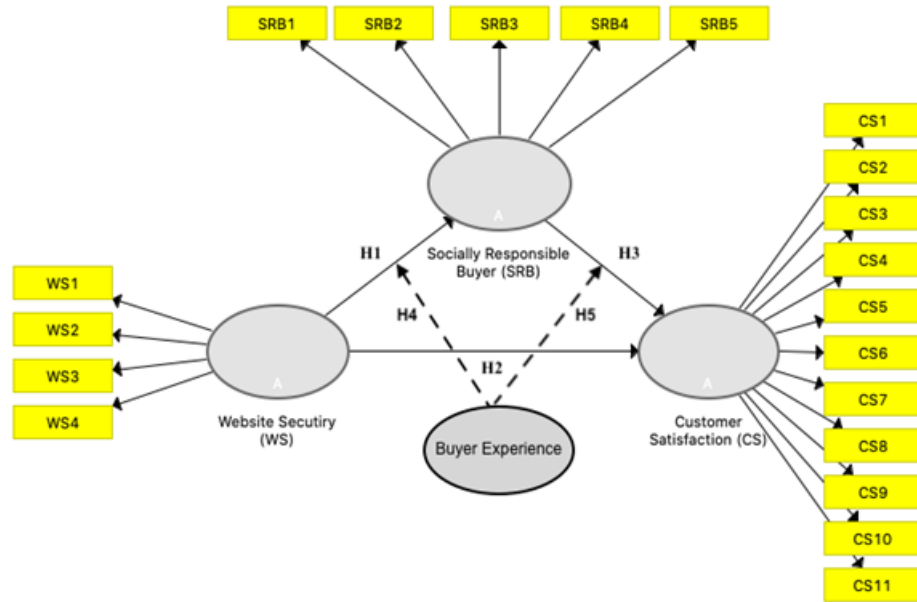


Table 1. Gender and Age of the sample

Gender	20 to 30 years	31 to 45 years	46 to 55 years	Total
Female	250	138	65	453
Male	97	62	51	210
Total	347	200	116	663

Source: Own elaboration. Table 1. This table shows the gender and age of the study participants, with women between the ages of 20 and 45 having the highest participation.

Table 2. Age and Electronic Device

Age	Smartphone	Laptop	Desktop	Electronic tablet	Total
20 to 30	231	91	15	10	347
31 to 45	117	59	21	3	200
46 to 55	47	41	24	4	116
Total	395	191	60	17	663

Source: Own elaboration. Table 2. Shows the ages and the electronic device that respondents use to make their purchases online. Being the Smartphone and the Laptop those that present a greater use in the online purchases.

Validation of the Questionnaire

Different tests were carried out to validate the questionnaire used in the research. 1) The content validity was carried out with the theories that support the study, which are directed towards purchasing behavior and with the use and adaptation to technologies, 2) a pilot test was carried out with 5% of the total of the sample, this in order to correct possible errors in the writing and understanding of the questions contained in the questionnaire, and 3) a factor analysis was carried out and Harman single factor test (common method of variance-CMV) is necessary to perform the following procedure: a) run a factor analysis of all the exogenous latent and endogenous latent constructs of the model and then an analysis of the main components without selecting any type of rotation method, and b) the values of the non-rotated components should be analyzed and the number of factors that complement the variance (Malhotra et al., 2006; Podsakoff et al., 2003). The results of this test are: 1) the model is grouped by 4 factors, 2) the Kaiser-Meyer-Olkin (KMO) indicator is 0.896 and significant at 99%, and 3) also the total variance explained is 60.47%. In addition, the explained variance of the first factor (22.58%) is less than the total explained variance, thereby ruling out the presence of response bias.

Measurement of Variables

Below is the measurement of the variables of the research model. All variables were measured under the approach of reflective type constructs in mode A and under the one-dimensional variable approach. These types of variables have very particular characteristics such as: 1) the direction of causality is from the construct to the indicators, 2) the indicators are highly correlated, 3) eliminating an indicator does not alter the meaning of the construct, and 4) these types of measures are recommended for a model with constructs focused on the analysis of behavioral sciences (Van Riel et al., 2017). The constructs that were used in the research model are described below. The items of the questionnaire are designed under a 7-point Likert-type scale (1 Completely disagree and 7 Completely agree).

Company Website Security (WS). This variable was measured considering the behavioral reasoning theory and the model of technological adaptation (Kulviwat et al., 2007; Sheppard et al., 1988). The construction is made up of 4 questions: 1. The website inspires security, 2. The website protects personal data, 3. The website makes good use of personal data and 4. The website has secure banking transactions. For its design and adaptation, the studies developed by Lee and Turban (Lee & Turban, 2001), Pavlou (Pavlou, 2003) and by Blut (Blut, 2016). The reliability and validity indicators of the variable are Cronbach's Alpha = 0.744, Factor Load = 0.696 to 0.787, Composite Reliability = 0.833 and Average Extracted Variance = 0.555.

Socially Responsible Buyer (SRB). This variable was measured considering the theory of social identity (Sidanius & Pratto, 2014) and the model of technological adaptation (Kulviwat et al., 2007). The construct is composed of 5 questions: 1. I try to reuse the products I have bought, 2. I buy products that do not harm the environment, 3. I buy products in support of social causes, and 4) I buy products from socially responsible companies. For its design and adaptation, the studies developed have been taken as a reference by Diamantopoulos et al. (2003) and by Buerke et al. (2017). The validity indicators of the variable are Cronbach's Alpha = 0.862, Factor Load = 0.765 to 0.841, Composite Reliability = 0.900 and Average Extracted Variance = 0.644.

Customer Satisfaction (CS). This variable was measured considering the theory of reasoned action and the model of technological adaptation (Sheppard et al., 1988; Westaby, 2005). The construct is made

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up of 11 questions that are related to the satisfaction of the website: 1. The information on the website is accurate, 2. The high quality of the information on the website, 3. Ease of interaction with the website, 4) I enjoy shopping on the website, 5) Fast delivery of the products, 6) There are competitive prices, 7) The website has a good reputation, 8) There is a wide variety of products, 9) High technological innovation of the website, 10) The website enjoys a good image corporate, and 11) Quick and timely service. For its design and adaptation, the studies developed were taken as reference by Zeithami et al. (1996) and by Hausman & Siekpe (2009). The validity indicators of the Cronbach's Alpha variable = 0.934, Factor Load = 0.726 to 0.820, Composite Reliability = 0.943 and Average Extracted Variance = 0.601.

Buyer Experience: This variable was measured through ranges or groups of online buyers based on the purchasing experience according to the number of years: 1. Online buyers with very little experience, less than 1 year in transactions with e-commerce, 2. Online buyers with little experience, between 1 to 3 years in e-commerce transactions, 3) Online buyers with average experience, between 3 to 5 years in e-commerce transactions, and 4) Online buyers with sufficient experience, with more than 5 years in e-commerce transactions.

Discriminant Validity of the Model

For this we have considered what was suggested by Fornell & Larcker (1981) and Henseler et al. (2015), which considers that the amount of variance that a construct captures from its indicators (AVE), must be greater than the variance that the construct shares with other constructs. The (diagonal) results of the vertical and horizontal AVE are below the correlation between the constructs.

Table 3. Shows the results of the discriminant validity test of all the constructs of the proposed model

Construct	AVE	CS	SRB	WS
CS	0.601	0.775		
SRB	0.644	0.311	0.803	
WS	0.555	0.436	0.205	0.745

Source: Own elaboration. **Table 3.** Shows the results of the discriminant validity test of all the constructs of the proposed model.

RESULTS

Structural Model

This section presents the results of the structural model of the investigation. The structural equation modeling (SEM) system based on variance has been used to test the hypotheses of the model. This is due to the fact that the variables used are focused on analyzing consumer behavior online (common 3.1. Subsection factor model). Experts in the methodology (SEM) and in the Partial Least Square (PLS), conclude that this technique is recommended for the analysis of phenomena in business sciences, marketing and information systems (Henseler et al., 2009; Hair, Jr., Sarstedt and Ringle, 2017). For the structural analysis of the data, it is required: 1) to evaluate the magnitude, the algebraic sign and the significance of the path coefficients, 2) to evaluate the 1-tailed student's t with n-1 degrees of freedom,

and 3) to evaluate the confidence intervals (percentile and bias-corrected) (Henseler et al., 2009). To obtain these indicators, a bootstrapping test with 5000 sub-samples is required (Chin & Dibbern, 2010; Joe F. Hair et al., 2014).

Table 4. Model Hypothesis Test

Hypothesis	Path coefficients	SD	T score	P value	f ²	Results
H1: WS -> SRB	0.205	0.040	5.173	0.000	0.044	Supported
H2: WS -> CS	0.389	0.035	11.203	0.000	0.191	Supported
H3: SRB -> CS	0.232	0.042	5.555	0.000	0.068	Supported

Source: Own elaboration. Table 4. Shows the results of the model hypotheses H1, H2 and H3, the path coefficients have a positive and significant effect at 99%. In addition, the value of the Standard Deviation (SD), value of t greater than 2. Note: n = 5000 subsamples: * p <.05; ** p <.01; *** p <.001.

To evaluate the quality, relevance and fit of the model, the adjusted R squared values have been analyzed: SRB = 0.041 and CS = 0.239, the recommended (Stone-Geisser test) Q squared value > 0 (Chin, 1998), our values of the independent variables are: SRB = 0.026 and CS = 0.138 Standardized root mean square residual (SRMR) is recommended >0.08 (Henseler et al., 2016; Hu & Bentler, 1999), our result is 0.066, Normed Fit Index (NFI) values close to 0.9 are recommended, our result is 0.887 and The Root Mean Square error correlation (RMSttheta), recommended value = < 0.12 (Joseph F. Hair et al., 2019), our result is 0.129. According to the tests carried out, the proposed theoretical model has an acceptable quality, predictive relevance and is adjusted to the theory.

Results of the Moderating Effect

Moderation describes a situation in which the relationship between two constructs is not constant but depends on the values of a third variable, called the moderating variable. The moderating variable (or construct) changes the strength or even the direction of a relationship between two constructs in the model (Becker et al., 2018).

Table 5. Model Hypothesis Test (moderating effect)

Hypothesis	Path coefficients	SD	T score	P value	Results
H4: WS*Buyer Experience -> SRB	-0.047	0.082	0.579	0.563	Unsupported
H5: SBR*Buyer Experience -> CS	-0.103	0.034	3.001	0.003	Supported

Source: Own elaboration

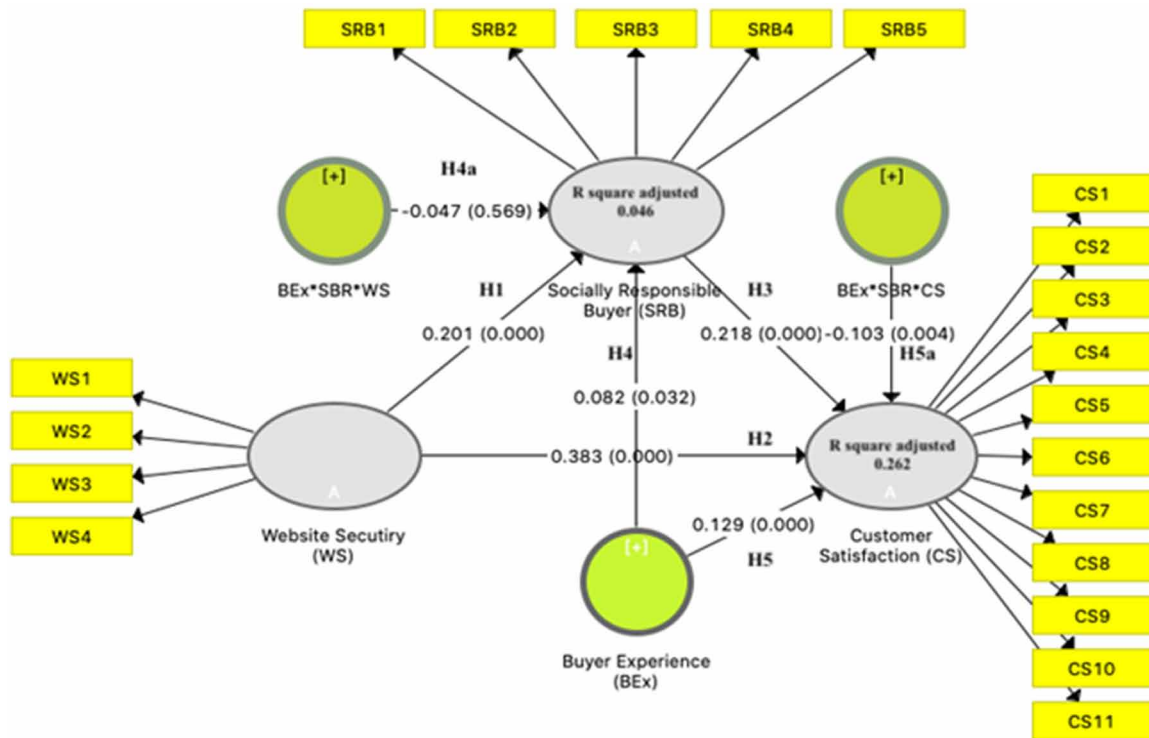
Table 5 and Figure 2 show the results of the moderating effect of the model, in them, it can be seen that the shopping experience does not have a moderating effect between website security and SRB (H4). In contrast, our findings report that the shopping experience is a moderating variable that significantly negatively influences SRB and customer satisfaction (H5). This shows that the online buyer experience, measured in years, is a determining element for socially responsible buyers to raise their level of satisfaction.

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In addition, it is important to note that when incorporating the original model, the shopping experience variable has a significant effect on the adjusted R^2 values for both the SRB and customer satisfaction.

Figure 2. Theoretical model (moderating effect)

Source: Own elaboration



Multi-Group Analysis

In this section we have developed a multi-group analysis (PLS-MGA) to know the differences between groups of buyers according to their shopping experience. Group 1: buyers with very little experience, group 2: buyers with little experience, group 3 buyers with medium experience and group 4 buyers with sufficient experience.

Table 6 shows the results of the multi-group analysis through the path coefficients and the p value of the structural relationships of the group model (buyer experience). The findings show that there are only significant differences between the sufficient experience group vs the low online shopping experience group, and also between the sufficient experience group vs the online shoppers with very little experience. These findings reinforce the moderating effect of the online shopping experience variable with the satisfaction of socially responsible buyers. That is, when there is a greater shopping experience based on the years, the level of satisfaction of responsible online shoppers is significantly affected, although the negative effect is most likely due to external factors such as insecurity, uncertainty, effects economic, technological and perceived risks caused by the effects of the Covid-19 pandemic.

Table 6. Model Hypothesis Test (PLS-MGA)

Hypothesis	(Enough - Little)	(Enough - Very little)	(Medium - Little)	(Medium - Very little)	P (Enough vs Little)	P (Enough vs Very little)	P (Medium vs Little)	P (Medium vs Very little)	P (Enough vs Little)	P (Enough vs Very little)	P (Medium vs Little)	P (Medium vs Very little)
SRB -> CS	-0.344	-0.317	-0.028	-0.001	0.992	0.988	0.554	0.487	0.016	0.025	0.892	0.973
WS -> CS	0.039	0.060	-0.013	0.008	0.338	0.254	0.520	0.454	0.677	0.508	0.960	0.908
WS -> SRB	-0.002	-0.035	0.101	0.068	0.458	0.569	0.213	0.277	0.915	0.862	0.426	0.554

Source: Own elaboration

FUTURE RESEARCH DIRECTIONS: DISCUSSION

In this section, the main findings of the study are discussed from the perspective of Latin American on-line consumers and during the Covid-19 pandemic, under a theoretical perspective based on the theory of planned behavior, the theory of reasoned behavior and technological adoption.

First of all, our findings report that website security has significant positive effects on the behavior of socially responsible buyers. This shows that these types of buyers are particularly focused on trust, security and perceived risks when shopping online (Hurlburt, 2012; Pernot, 2020). Our findings are in the same direction with classical and contemporary studies on socially responsible behavior (Ellen et al., 1991; Schramm-Klein et al., 2016). In this same direction, the results report that the security of the company website has a positive and significant effect on the satisfaction of customers or socially responsible consumers (Blut, 2016; Limbu et al., 2012). Therefore, responsible social buyers by relying on website security and the other benefits of online business, their level of satisfaction is significantly affected. The actions that socially responsible buyers of company websites trust most are: security when making a purchase, safeguarding information (data protection) and secure banking transactions (Hausman & Siekpe, 2009; Rita et al., 2019).

Second, the findings have reported that socially responsible buyers have a positive and significant effect on the level of customer satisfaction. These results are in line with the studies analyzed in this manuscript, since these types of buyers have high demands and demands for online businesses. Among these demands are the reputation of brands, products made under ecological processes, products with recyclable materials and products from socially responsible companies (Fazal-e-Hasan et al., 2018; Panda et al., 2020). All of these have permeated a large number of actions from regions and communities in different countries. This has led to today's consumers having a greater ethical, civil and ecological awareness (Ingenbleek et al., 2015; Raman et al., 2013).

Third, our model analyzed the moderating effect of the shopping experience variable; this has reinforced the development of the literature on socially responsible consumer behavior (Javed & Wu, 2020; Robina-Ramírez et al., 2020). The findings report that the buyer experience has a significant negative effect on the behavior of socially responsible buyers and the level of satisfaction. With this, it is shown that the demands of this type of buyers are increasing and the more experience they will have, the greater and with it the level of satisfaction will be affected significantly (Cuesta-Valiño et al., 2019).

CONCLUSION

The study has proven that socially responsible buyer behavior is one of the phenomena that is growing in most regions and in Latin America it is no exception. Therefore, the work has yielded the following theoretical and empirical implications. In the first place, from a theoretical point of view, the work contributes to the development of the literature of full behavior by analyzing the attitudes and behaviors of the socially responsible buyer through the perceived value of the purchases made through e-commerce transactions, for on the other hand, the theory of reasoned behavior shows that online businesses must develop innovative marketing strategies for these types of buyers and finally, the technological adaptation model shows that socially responsible consumers have a high level of satisfaction due to the trust of the websites.

From an empirical point of view, our work has an important contribution to the business context for the development of business models based on e-commerce, on the design and trust of digital platforms and on more focused marketing campaigns, therefore the study suggests: 1) adoption of business models based on new digital platforms; 2) adoption of business models based on APPS, e-mobile and artificial intelligence; 3) development of online advertising campaigns with the support of social media such as Facebook, Instagram, Marketplace and Twitter, among others; 4) adoption of business models based on the circular economy to produce ecological products and materials that are beneficial to the environment. For professionals in this field of action, it is important to continue with the analysis of this type of consumer in order to show their results and establish links with regional governments in order to work together with businessmen and civil society. The work under study is not free of limitations since the study has been developed under a pandemic context and with the perception of socially responsible buyers from a single region, so that in the future this type of study can be extended and compared with other regions. Another limitation is the sampling frame used in the study, which is limited to the north-west region of Mexico, so that future studies may be carried out in other regions of the country or other countries. The last limitation is related to the type of statistical analysis used, despite being one of the most used by the psychology and marketing literature, other techniques can be used that focuses on the analysis of covariance. Given the importance of socially responsible online consumer behavior, it is important to continue analyzing this phenomenon regionally and globally; for this, it is recommended to incorporate other constructs that further strengthen this type of study. Some phenomena that can be included are the behaviors of other types of buyers and business reputation.

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Chapter 6

DataPro: A Two-Fold Big Data Reskilling Solution for Unemployment and Data Professional Shortage

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ABSTRACT

Due to the COVID-19 pandemic, most countries are exposed to unprecedented social problems in the current global situation. According to the official reports, it caused a dramatic increase of 44% in graduates' unemployment rate in Portugal. Moreover, from the human resource point of view, the whole of Europe is expected to face a shortage of 925,000 data professionals by 2025. Given the existing situations, the DataPro aims to propose a national-level reskilling solution in big data to mitigate both social problems of unemployability and the shortage of data professionals in Portugal. DataPro project consists of four dimensions, including an online portal for the hiring companies and unemployed graduates, along with a web-based analytics talent upskilling (ATU) platform empowered by an artificial intelligence recommender system to match the reskilled data professionals and the hiring companies.

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INTRODUCTION

At the beginning of 2020 in Davos, World Economic Forum launches the Reskilling Revolution to help economies by providing better education, better work, and new skills for the fourth industrial revolution for 1 billion people around the world by 2030 (Cann, 2021). Reskilling Revolution platform designed to prepare the global workforce with the skill needed to future-proof their careers against the expected displacement of millions of jobs and skill instability due to the technological transformation. They designed to equip businesses and economics with skilled labor needed to fulfill new roles created by IR4.0 and shift industrial transactions towards sustainability. This is supported by governments of the Russian Federation, India, Oman, Pakistan, Denmark, Singapore, and the United Arab Emirates (Cann, 2021).

The recent Covid-19 pandemic impacted various industries, and many companies in different sectors are pushing employees to acquire digital work skills to support an increasingly digital business landscape (DeAngelis, 2020). Covid-19 is not the main reason as many countries faced a skill mismatch (supply does not fit demand) even before the pandemic while the pandemic makes it worse, which highlight the red lights that this needs special attention from the governments, and they should take action “not only to address the short-term challenges but also to rebuild their human capital for the future” (DeAngelis, 2020). This evidence shows that business leaders need to support and encourage continuous learning in their organizations if they want to stay ahead (DeAngelis, 2020).

This chapter explains the DataPro project in the implementing stage in Portugal. This project can implement in different industries and sectors, including manufacturing, government services, health care, and financial services. By capitalizing on the use of DataPro and ATU, companies can measure their workforce capability, reskill and upskill and place them in the right position to improve efficiency, reduce cost, better planning and improve productivity, and outperforming their competitors. The government can picture the country’s data professional shortage and industry capabilities and needs.

BACKGROUND OF THE STUDY

Employability

Schultz (1961) suggested that education is key to development and economic growth in every society. High-quality education can improve the labor force capabilities and increase productivity. Employability is an essential component of the education outcomes and entails the professional development of university graduates with experience and practical skills. It refers to graduates’ abilities to acquire and improve the necessary skills applicable in the job market context (Hillage and Pollard, 1998). Other researchers such as Boeteng and Ofori-Sarpong (2002), Yorke (2006) defined employability as “a set of skills, knowledge and personal attributes that make an individual more likely to secure and be successful in their chosen occupation(s) to the benefit of themselves, the workforce, the community, and the economy” (Okolie et al., 2020).

Technology is changing rapidly, that universities cannot keep up. Graduates from universities with a tech-related degree are not employment-ready, and they still need that “last mile” of training for specialized skills. Universities provide the foundation, while the third-party skill company should fill the gap, provide solution-oriented experience on various issues and complete the final training (Vianello, 2020).

A PwC survey in the United States shows that 69% of employers expect candidates to have Data Science Analytics skills, while just 23% of university leaders indicated that their students are equipped with those DSA skills (APEC, 2017). Several companies collaborating with the universities to enable faculty and students, the example is NASSCOM (National Association of Software and Service Companies, India), that has notified on the employability of tech graduates and talent shortage forecast in 2020 for the IT industry in India and the need for industry intervention strongly (Mamatha et al., 2020).

In India, only 7% of top 20 B-schools university graduates could obtain satisfactory jobs and are employable in the industry (Assocham, 2016), because of the lack of practical hands-on training and poor industry-related knowledge of faculty members (Bhatnagar, 2020). A similar situation is in Nigeria; the high unemployment rate is not related to a lack of jobs but due to a lack of generic skills that the labor market needs and skills gap and mismatch (Oladokun and Olaleye, 2018).

Unemployment

In 2018, World Economic Forum (WEF) predicted that by 2022, the IR4.0 would render 75 million jobs obsolete in the large enterprise subset alone. Multitudes of employees with lack requisite new skills, including data analytics skills, will be displaced in the process (Cann, 2021). The lack of employment is a severe problem across regions. Based on the McKinsey report, by 2020, the world will face a shortage of 38-40 million highly skilled workers, and by 2030, it will increase to 85.2M workers. Technology trends and the worldwide market are the main factors influencing the rising global talent shortage.

This talent shortage leaves demand unmet from employers, as firms cannot scale operations to launch new products and services. In 2012, Gartner estimated the creation of 960,000 new Data Science Analytics jobs in Asia-Pacific by 2015 but warned that only one-third of these positions would be staffed due to skills shortages (Charette, 2013). By 2020, Viet Nam is expected to face a shortage of over 500,000 employees with DSA skills, while 80% of workers do not have the necessary skills to participate in the digital economy. Based on the IDC Teradata report, firms in Indonesia and Thailand face the same challenge to deliver the full value of big data analytics to customers imposing limits on potential growth in several sectors. China, Japan, Singapore, Malaysia, Australia, and United States face Talent shortages as well. In Nordics, software developer shortage is a problem while in Sweden lacking 70KIT or digital-related competencies by 2022. By 2026, the shortage of engineers in the United States will exceed 1.2M (DAXX, 2020).

Impact of Talent Shortage

Companies worldwide risk losing \$8.4T in revenue because of the lack of skilled talent (DAXX, 2020). Research shows that by 2030, the global talent shortage will reach 85.2 million people—costing companies trillions of dollars in lost economic opportunity (McLaren, 2018). Talent's shortages constrain economic growth and prevent firms from scaling up operations, launching new products and services, and meeting demand in new locations while impacting competitiveness and productivity. Skill shortages hindered organizations from keeping pace with change and unlock the potential of new technologies, reduced the ability to serve clients, and decreased creativity and innovation (APEC, 2017; Skinner, Saunders and Beresford, 2004; Wintrop, Bulloch, Bhatt and Wood, 2013). Data science skills and capabilities in financial sectors make banking more profitable, make healthcare more efficient, and make governments more responsive in several ways (APEC, 2017).

Singapore announced healthcare IT and data analytics as a critical pillar of healthcare training to improve health outcomes, pool information for more effective, efficient patient care, and cuts costs. In Canada, eHealth employs around 50,000 workers and is predicted to reach 80,000 by 2020 and generates annual revenue of US\$3.4 billion annually. Singaporean emphasizes the importance of big data analysis and survey among CFOs, showing that big data analytics significantly impact the sector. Singapore government plan to train around 10,000 public servants to address issues of data science and service delivery (APEC, 2017). Government service can be improved by transferring citizen service online, which will increase efficiency, transparency, and cost-effectiveness. Data Science analytics skills will allow opportunities to create algorithms to reduce error and fraud in tax collections and transfer payments. Data analytics skills to analyze Big data will improve retailer positions through inventory management and better demand prediction, while consumers will likely see greater product selection and lower prices (APEC, 2017). This evidence shows that the data professional and related skills are necessary for various jobs and industry; another example is government agencies such as the state wildlife department that might use data and analytics to analyze customer interactions, generate revenue for funding recreational activities, help serve constituents, and conserving natural resources. However, it is doubtful that many wildlife employees are adept at business analytics. This creates the need for reskilling or upskilling the employees to do the job and use the new digital technologies.

Upskilling and Reskilling

Globalization, industry transition, and technological change are impacting jobs and the skills required within those jobs. Looking at 702 different occupations in the United States, 47% of jobs are vulnerable to computerization (Starling, 2020). New York times predict that the United States faces around 13% unemployment rate compared to before Great Depression. Around 6.6 million Americans applied for unemployment in March 2021, making the worst week for unemployment since 1982 (Mardinger, 2020). Millions of jobs are liable to be radically transformed by technology, and nearly half of core skills are set to change by 2022 alone, which creates skill instability. McKinsey Global Institute (2017) predicted that due to automation and artificial intelligence, as many as 375 million workers would have to switch occupations or acquire new skills by 2030. According to McKinsey's prediction (McKinsey Global Institute, 2017), around 14% of the global workforce would have to switch occupations or acquire new skills by 2030 because of automation and artificial intelligence. 87% of executives said they were experiencing skill gaps in the workforce. There is a need for workers across industries to adapt to changing conditions and match the new roles and activities. This fast change creating new professions and roles for which there are not enough candidates with the right training (<https://www.iberdrola.com>) or new role in engineering, product development, and cloud computing that face talent shortage (Cann, 2021). The introduction of more automation and AI in the workforce changes the skills required to do most of the job. For example, a marketer will need to learn new digital tools and skills to engage with their audience and manage the digital environment (ReWork, 2020). The report by McKinsey Global Institute shows that by 2030, 14% of the global workforce will need to change their job or acquire new skills (O'Donnell, 2020).

Technology is rapidly evolving and creates the need for an organization to hire, upskill or reskill the employees to use the technology in the process, product, or improve customer services. Companies need newer skills like big data analysis, machine learning, and data visualization to make a more informed decision in this competitive landscape. They need some professionals to know advanced statistical tools

and quantitative methods to integrate large data sets and analyze the data (Das, 2020). Evidence shows that reskilling challenges will be more applicable for operationally intensive sectors, such as manufacturing, transportation, retail, and operation-aligned occupations such as maintenance, claim processing, and warehouse order picking. Companies will require people with the right skills to develop, manage, and maintain their automated equipment and digital processes. It is predicted that in Europe and the United States, demand for technological skills is expected to rise by more than 50%. Automation and digitalization will create significant gaps in operationally intensive sectors (Ellingrud Gupta and Salguero, 2020).

World Economic Forum estimated that 54% of current employees would require significant upskilling and reskilling by 2022 (Cowell, 2020). Workers across the industries have to figure out how to adapt to changing conditions, while companies must learn how to match them to new activities and roles. This dynamic is about how leaders can upskill and reskill the workforce to deliver new business models and plan human capital development accordingly (Cann, 2021). Cowell (2020) indicated that “To prevent an undesirable lose-lose scenario—technological change accompanied by talent shortages, mass unemployment, and growing inequality—businesses must take an active role in supporting their existing workforces through reskilling and upskilling, that individuals take a proactive approach to their lifelong learning.”

In preparation for the forthcoming pressures on future employment, governments worldwide are preparing in different ways. Singapore’s formed a Workforce Development Agency unit responsible for skill upgrading, skills conversion, and enhancement of employability of lower-skilled workers (World Economic Forum Davos, 2019; Albert et al., 2020). They have a system called “Second Skilling”, which allocated some money to each Singaporean for skill training of their choice (Starling, 2020). In the US, the Government has called on companies to commit to the upskilling and retraining of their workforce via the Pledge to America’s Workers (Cann, 2021). In 2019, Amazon announced its upskilling 2025 Pledge to spend \$700 million retraining non-technical employees for analytics, data, and technical roles such as machine learning, healthcare analytics, and computer science (Cowell, 2020). Another report from Amazon shows that they retrain 100,000 workers to put them on a relevant career path in the face of automation. For example, warehouse floor workers were prepared for new roles as IT technicians, and low-level coders were transited into data scientists (ReWork, 2020). LinkedIn shows that during 2020, 51% of the companies globally plan to implement an upskilling program, while 47% plan to implement the reskilling program. It is more than worthwhile to invest in upskilling employees rather than losing them. The priorities should give to the most vulnerable positions and those jobs that are quickly becoming obsolete (Ortiz-Barbachano, 2020).

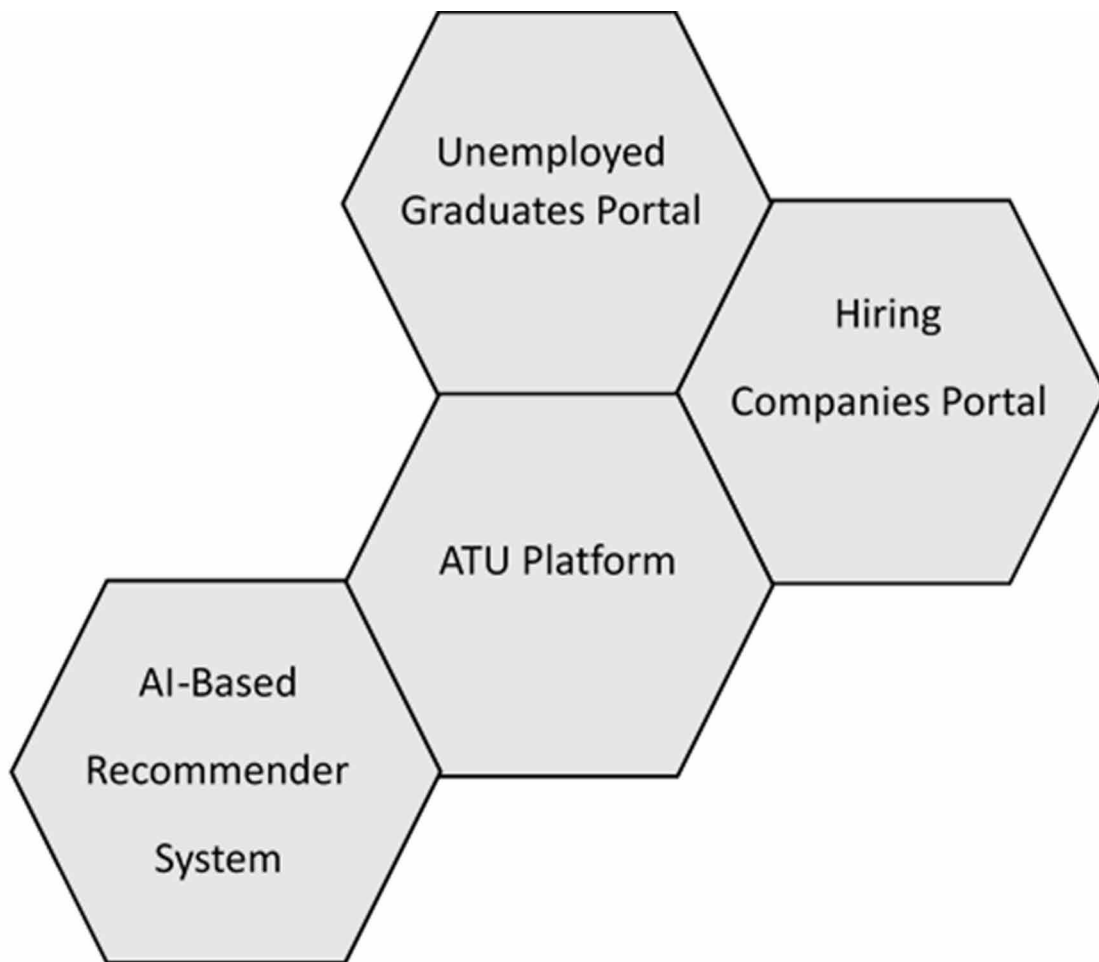
Upskilling aims to teach employees new skills and create more specialized workers to optimize their performance. It refers to the process of expanding an employee’s capability and aptitude to meet future business goals and keeping the firm competitive in the market (Joshi, 2020). Supplementary to up-skilling processes, reskilling - also known as professional recycling- sets out to train employees to adapt to a different post within the company and make them more versatile. Reskilling can assist workers to sustain themselves in the industry and avoid lay-off decisions by firms. Reskilling is the process of upgrading an employee’s skill set towards new employment opportunities (Joshi, 2020).

Considering the needs for reskilling and upskilling the employees and creates more professional and specialized workers to optimize the performance the following section will discuss DataPro Project stages and the process of the implementation.

DataPro Framework

Aligned with the European Commission's priorities in solving the social problems caused by the Covid-19 pandemic, DataPro is proposed as an online re-skilling and upskilling platform in the data analytics domain to mitigate the after-Covid unemployment problem in Portugal. At the same time, this model can be used in other countries after that. As depicted in Figure 1, the DataPro framework consists of four main elements, including (i) Unemployed Graduates Portal, (ii) Hiring Companies Portal, (iii) ATU Platform, and (iv) AI-Based Recommender System.

Figure 1. DataPro framework



(i) Unemployed Graduates Portal

This is a portal to be used at the national level. All unemployed individuals in Portugal who graduated from universities and higher educations can register in this portal.

(ii) Hiring Companies Portal

Aligned with the worldwide strategies in digital transformations, there is a massive shortage of data professionals globally. According to the EDM Monitoring Tool (EDM, 2019), Europe will face a shortage of 925,000 data professionals by 2025. So, this portal is embedded in the DataPro framework to create an online database of companies looking for data professionals to hire.

(iii) ATU Platform

Analytical Talent Upskilling (ATU) is an online Big Data Analytics upskilling program provided by Analytics Academy of Data Corner. ATU is a service for companies and organizations to reskill upskill their existing team or build an in-house data science team. It provides a whole lifecycle for upskilling: Talent skill pre-assessment, training programs, and talent skill post-assessment.

The unemployed graduates registered in the DataPro portal will be assessed in the ATU platform to detect the talents with good potentials to become data professionals. After passing the dedicated upskilling programs, the selected candidates will attend another skill assessment to evaluate their upskilling progress.

Figure 2. ATU Pipeline



(iv) AI-Based Recommender System

To select and introduce the most related candidates among the trained data professionals to the companies who submitted their hiring requests with the help of an AI-based recommender system is embedded in the DataPro framework. It utilizes machine learning methods to make the best match between upskilled candidates and hiring companies.

DISCUSSION AND CONCLUSION

This research aims to provide new knowledge on the usage of DataPro for reskilling and upskilling employees, and inform industries, big companies and government, of needed reskilling and upskilling their labor, and invest in new skills related to professional data competencies, enabling current employees, fresh graduates, unemployed and underemployed groups to find a suitable job in a data-driven landscape and move fluidly into labor markets in a different region. DataPro project is commissioned to identify the qualified candidates, measure the skills and competencies, propose suitable courses for upskilling and reskilling, and train them to join the industry or secure the job. Knowing the employee's capabilities and what skill they need to improve ensures that training and knowledge are aimed at on-the-job goals, and money spent in training by firms or governments is aimed at bridging gaps. Defining the data professional worker's skills and competencies enables the universities and educators to frame practical and needed programs. This research highlighted the social and economic impact of implementing the projects across the region, flagging the need to highlight this issue across economies, stakeholders, and industry sectors.

The finding of this research shed additional light on the future of the workforce, the impact of digitalization, and the need for upskilling and reskilling the current workforce to prepare for the changes. Today skills will not match the jobs of tomorrow, and newly required skills may become obsolete very fast. The technological changes create new skills or the urgency to have digital skills to perform the current job. There is always the need for training, reskilling, and upskilling the workforce. Investment in upskilling and reskilling employees can improve employee engagement and retention, boost productivity, and help to attract new talent (Gallagher, 2021).

The workers need to have at least baseline digital skills, and critical to equip new workers with digital skills to succeed in the workforce. Developing additional skills to help them move to a new role (reskill) and provide training that enables them to become better at a job they already perform (upskill) will make them adaptable forces that can shift and bend with any changes in the market. As a result, employees will have greater knowledge to react to what the industry and market demands. In turn, the organization leverage the skills to carry the organization across murky waters (Mardinger 2020). It is necessary for the companies to learn how to reskill and upskill the workforce to deliver new business models in the post-pandemic era. Companies should craft a talent strategy that develops employees' critical digital and cognitive capabilities and adaptability to resilience (Agrawal, De Smet, Lacroix and Reich, 2020).

Businesses and governments must collaborate to equip workers with the skills they need to prevent workers from left behind. Reskilling and upskilling programs can improve employee retention and engagement and attract new talent, increase collaboration between the department and increase the adoption of new trends within the economy (Elfond, 2020). Some companies like Amazon planned for reskilling the workforce even before pandemic. Amazon has invested \$700 million into reskilling and upskilling programs (Elfond, 2020).

Reskilling and upskilling are cheaper than hiring and training a new worker. Reskilling the team will create a better-rounded, cross-trained workforce, which will increase the team's effectiveness and productivity. Reskilling will minimize turnover by investing in employee growth (ReWork, 2020). Upskilling will help the employee improve upon existing skills, deepen their abilities, and expand their knowledge. They will be prepared to hold additional responsibilities and higher-level roles on the particular career track. Upskilling will keep the workforce and company agile by ensuring learning initiatives are relevant to future business objectives and tailored to the needs of learners and the company. No business

will survive for long without upskilling and reskilling initiatives driven by a new skilling strategy. By implementing a system that can identify what skills are needed for the future and which employees currently possess, they can develop those in their workforce (ReWork, 2020). Companies need to constantly evaluate employees' capabilities and the future skills needed for their business to thrive (ReWork, 2020).

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Chapter 7

Disruptive Innovation in Communication Apps: The Case Study of WeChat Pay During COVID-19

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ABSTRACT

The emergence of social payment and usage of social apps for buying and selling services and products was considered as threats to the banking industry. The usage of WeChat in China has fundamentally altered the whole digital communication landscape. WeChat has over 1.17 billion users. During the COVID-19 pandemic, WeChat implemented various plans to help recover from the COVID-19 pandemic, including consumer awareness, WeChat live stream communication platform, and one-to-one consultation through social media services to assist retailers and increase sales. In addition, they implemented WeChat Work 3.0 for remote working during the pandemic, cross-border e-commerce, and Mini Club Program to convert overseas brick-and-mortar shoppers to online members. WeChat and Facebook facilitated WeChat pay and Facebook pay through their social commerce platform because of market power. This chapter discusses the emergence of WeChat and how it impacts the payment systems.

INTRODUCTION

Digital wallets and digital payments are gaining significant traction among consumers as they can move away from cash dependents payments due to the Covid-19 pandemic and social distancing. Contactless payments upsurge even within cash-based economies such as Germany UK, and Japan (Maynard, 2021). According to the Mastercard survey, 82% of respondents worldwide view contactless payment as the cleaner way to pay, and 72% indicated that they would continue using contactless payment post-pandemic

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(Financier, 2020). On the other end of the spectrum, digital payments were one of the government's tools and facilitated government efforts to disburse funds to those in need and allow households and firms to access online payment and financing. Digital payments allow financial support to reach those in need, particularly to the unbanked, to women, informal sector faster, and paying public wages and salaries digitally.

Many governments utilized digital payment technologies to manage the financial aids during Covid-19. The government in some countries used digital G2B payment systems to transfer wages for staff, employee retention funds for SMEs, and lending programs for businesses. To prevent the spread of Covid-19, some governments provided incentives to pay for goods and services digitally via e-wallets. China used consumption coupons disbursed via Alipay and WeChat pay; India facilitates transfers via Aadhaar-linked accounts; Kenya, Tanzania, Uganda leveraging the system for transfer (M-Pesa), and other countries such as Iran, Colombia, Morocco, Peru have been expanding or leveraging existing digital payment systems (Agur et al., 2020).

Some other countries facilitate rules and regulations to facilitate digital payments among individuals and merchants. They have cut mobile money transfer fees, increased transaction size limits, and creates contactless credit provisions for businesses to eliminate personal contact (Agur et al., 2020). Jordan is among the countries that are projected to contract around 4% because of this crisis, and most households had difficulties accessing food and livelihood loss resulting in difficulties to access financial services. The government in Jordan supported citizens in using FinTech applications during the lockdown and announced that digital wallets should be used as the main methods to transfer salaries for the private sector and the unbanked population (Al Nawayseh, 2020).

During the Covid-19 pandemic, Mobile payment (paying goods, services, and bills by mobile devices) was significantly adopted in many countries, including China. According to a report from China banking and insurance news (2020), the number of mobile transactions during the Covid-19 pandemic was 22.4 million in the first quarter of 2020. Based on CNNIC (2020), the percentage of mobile transactions increase from 73.5% in 2019 to 86% in 2020 (Zhao & Bacao, 2021). China handled 532.814 billion mobile payment transactions worth RMB445.22 trillion in 2018. After the outbreak of the Covid-19 mobile payment transactions in China will reach RMB777.5 trillion in 2020, surging by 31.8% on an annualized basis. WeChat Pay allows a customer to pay via in-app service and connected banks and book hotels, trains, flights, and buy movie tickets (Intrado, 2020). A high growth rate of M-payments is predicted in the next few years, with the expectation of \$26.341 trillion by 2026.

WeChat and Facebook developed social commerce platforms accepting Facebook Pay or WeChat Pay because they can exercise market power (Phua, 2021). Facebook and PayPal joined Google and Tencent. Grab, a popular Asian app has been keeping busy by purchasing stakes in popular e-wallets such as Indonesia's LinkAja (Phua, 2021). More than 40 e-payment licenses are issued in the Philippines, Malaysia, and 41 licensed e-wallet operators in Indonesia. GoPay, Dana, Grab, GCash, and MoMo are among the popular ones (Phua, 2021).

WeChat is introducing procedures to ease retail recovery from the Covid-19 pandemic in China. WeChat announced that partnering with some major technology platforms, including Facebook and Microsoft, to invite developers to a global hackathon to help the fight against the coronavirus pandemic with technology (CISION, 2021). They aim to build locally or globally focused creative technological solutions to overcome the challenges caused by Covid-19 (CISION, 2021). WeChat has played a crucial role in creating public awareness about Covid-19 and digitalizing public services in China (CISION, 2021).

Disruptive Innovation in Communication Apps

Some of the action from WeChat during pandemic includes WeChat live for businesses, WeChat work 3.0 which has a key platform for remote working during the pandemic, connecting enterprise with customers, WeChat pay which facilitate payments and cross-border e-commerce, and local orders and scan-and-go self-service during the pandemic (Arnold, 2020). WeChat has launched the “WeChat Retail Growth Plan,” a WeChat Live Livestream communication platform to facilitate the interaction between businesses and customers and generate sales via live streaming. It creates the possibility for consumers to watch the Livestream, make purchases and communicate in real-time. WeChat creates 1 on 1 consultant social media service to assist retailers in managing fans, helping drive traffic and sales through their networks of social connections. This service creates the possibility for the service staff to start a direct conversation with followers of retailers’ WeChat official social networking accounts, personalized their services, and provide related information to increase repurchases (Berthiaume, 2020). Around 780 million users are on the social media networking section WeChat Moments, and each day around 120 million users post in social Networking Moments, 360 million read Official Accounts Articles, and 400 million user access Mini Programs.

This chapter aims to discuss WeChat history and the concept of social payment. This study will conceptualize how this communication app impacts the payment system and cause a significant change in the financial system. In the first section of this chapter, we will discuss the digital transformation of the payment system and disruptive innovation. Then we will present the theory of disruptive innovation while we will conceptualize WeChat based on the theory of disruptive innovation. The last section of this chapter will discuss other related issues, including mobile payment, social payment, and virtual identity.

Digital Transformation of Payment System

Digital wallets were introduced to the market a few years ago. Google Wallet was launched in 2011; however, it had minimal impact on the market due to low consumer awareness. Many other forms of digital wallet promoters, such as Apple Pay and Samsung Pay, included mobile wallets that are operated by global telecommunication carriers. However, this did not improve mobile payment trends despite its large subscribers’ base and adequate technology know-how compared to WeChat Pay, spreading across the merchants and consumers in China.

WeChat Pay was first introduced in January 2014 and gained popularity in China through WeChat’s virtual “red envelope” (known as “red packet” in Malaysia) campaign.

Red packet is a Chinese tradition of giving money as a gift to friends and family members during special occasions such as the Chinese Lunar New Year, weddings, and birthdays. It also acted as a form of “wishing good luck” to the red packet recipient. Statistics show that digital red pockets transactions reached close to 823 million people in China to send electronic hong bao to relatives and friends in 2019 (Phua, 2021). WeChat Pay quickly expanded its functionality from purely a social gift gimmick to one of the most preferred mobile applications for retail payments in China.

The innovative use of WeChat Pay redefined the future of mobile commerce adoption in Chinese businesses. It offered great insight to researchers and entrepreneurs in studying the role and impact of social communication apps on the mobile commerce ecosystem and encouraged many tech companies to venture into digital payment systems. WeChat was disrupting the payment systems and considered an innovation in the payment ecosystem.

The concept can be explained based on Christensen's Disruptive Innovation Theory. The innovative use of payment features within the WeChat app highlighted the disruptive innovation concept. In this study, we tried to conceptualize the WeChat payment system and its impact on the retail banking industry.

Innovation has been an active area of research in almost all fields of scholarly research for many decades (Baregheh et al., 2009). Innovation has been linked to higher productivity, growth, and development of firms, states, and nations. With information and communication technologies (ICT) becoming ubiquitous over the past few decades, the impact of ICT on all kinds of innovation is fast increasing (Avgerou, 2008).

The success of innovations depends on understanding the early adopters. It is important to distinguish the different types of innovations, especially the systematic differences and similarities between early adopters of disruptive innovations and early adopters of sustaining innovations. Hence, managers must address early adopters differently and differentiate the product development and marketing strategy following the type of innovation (Reinhardt & Gurtner, 2015).

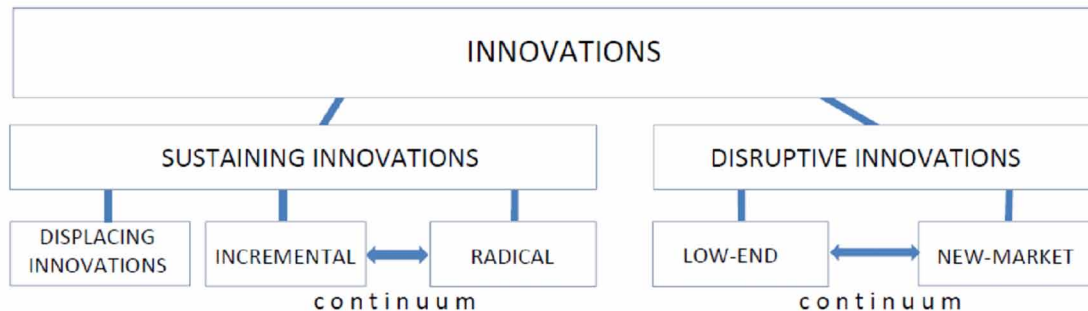
The theory of disruptive innovation addresses the relevance of differences among innovative customers (Christensen, 1997). This theory posited that if established firms listen solely to the opinions of their current customers, they might be misled. For example, a BlackBerry customer who used to write emails will prefer an integrated keyboard over a touch screen, and consequently, BlackBerry did not invest in touch screen technology. Hence, technologies rejected by current customers will later be displaced. When the majority of these customers later switched to iPhone, BlackBerry was duly displaced. Hence, researchers need to understand that early adopters of disruptive innovations and sustaining innovations have different needs and characteristics (Reinhardt & Gurtner, 2015).

Christensen (2000) initially divided the business model innovations into two categories: sustaining and disrupting. Sustaining innovation emphasizes continuous improvement in product performance and maintaining competitiveness. It ranges in difficulty from incremental to radical. The incumbent companies typically lead to the development and adoption of these sustaining innovations. Christensen (2004) clarified that many of the most important and profitable innovations sustain innovations that continuously improve existing products or services. On the other hand, disruptive innovations redefine performance trajectories, and they are often created by alternative entrant companies (Christensen, 2000).

As pointed out earlier, Christensen and Raynor (2003) refined the original theory by further dividing disruptive innovations into low-end and new-market disruptions. Christensen (2006) later noted that these two are fundamentally different phenomena. Figure 1 illustrates how Christensen and co-authors categorized sustaining and disruptive innovations.

A new-market disruptive innovation enables a new customer base previously non-prospects (non-consumers) to begin buying and using the product or service (Christensen, 2006). They also bring new benefits, such as convenience and customization (Christensen et al., 2004). In contrast, low-end disruptions attack the least-profitable customers' base of incumbent companies by offering relatively low-priced products or services [Christensen & Raynor, 2003]. However, it is worth noting that some disruptions are hybrids that combine both new-market and low-end dimensions. Low-end and new-market disruptions form a continuum, and innovation can thus find its place anywhere within it.

Figure 1. Innovation Categories



Process of Disruption

Disruptive Innovation

Disruptive information technology (IT) is defined innovation as architectural innovation originating in an IT base that has subsequent pervasive and radical impacts on development processes and their respective outcomes (Lyytinen & Rose, 2003). Disruptive IT innovation revolutionizes operation processes and provides firms with major new growth in business, dramatic improvements, and a more efficient unit performance (Kostoff et al., 2004). Engaging in innovation activities also help firms be aware of the latest development, absorb new and related knowledge, and develop dynamic capabilities that equip firms with abilities to handle dynamic market changes (Cohen & Levinthal, 1990; Roberts & Amit, 2003).

Researchers understand disruptive innovation as a process and describe this process in the following manner. A new and potentially disruptive product underperforms the performance dimension that mainstream customers have historically valued. However, the product performs better on a secondary performance dimension or is less expensive than existing products. Incumbents initially dismiss these disruptive innovations because their current customers demand improvements to the primary performance dimension and do not value increased performance concerning the secondary performance dimension or a lower price. Meanwhile, entrants develop potentially disruptive innovations and sell them in a niche or emerging market (Reinhardt & Gurtner, 2015).

Christensen (2000) initially compares the performance trajectories of an incumbent technology and the entrant to illustrate the disruption process. In this model, he assumes that the incumbent and entrant's product performance improve over time, represented by the ascending solid lines in Figure 2 (Christensen et al., 2004).

The left trajectory depicts the incumbent's offering, while the right is the entrant offering. The dotted lines represent the product performance scale and market demands (Christensen et al., 2004). Generally, a market is made up of different customer segments and can be classified based on their respective scale of demands. Higher-end markets represent very demanding customers, while the lower end is less demanding due to their relatively less complex satisfaction requirements. The dotted lines illustrate these "tiers," and the core of the market is the customers are somewhere in the middle or the mainstream customer who plays a key role in the process of disruption (Christensen et al., 2004).

Figure 2. The Impact of Sustaining and Disruptive Technological Change

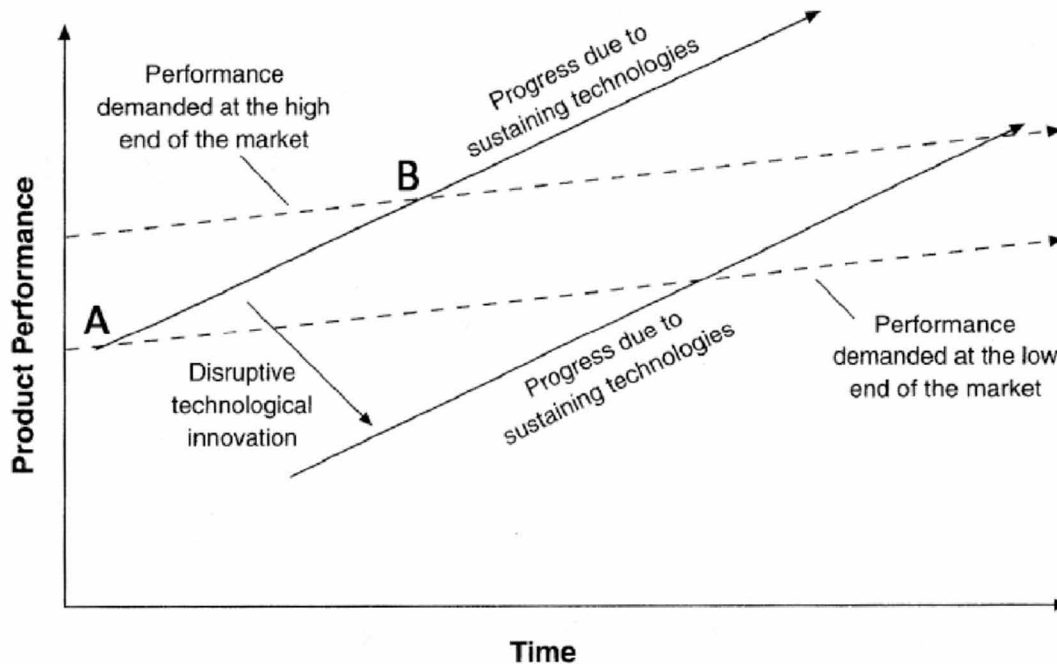


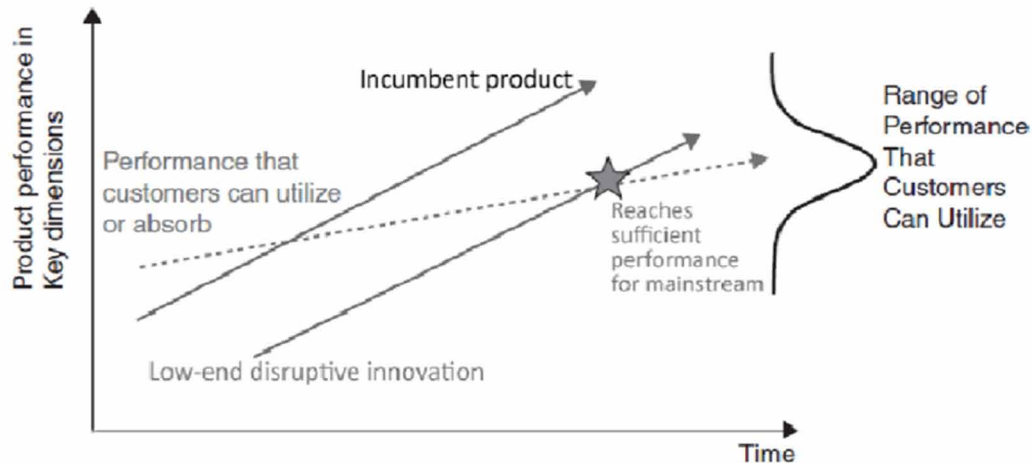
Figure 3 shows the point where the disruptive product begins to threaten the incumbent seriously. It is important to note that the disruption only occurs when the disruptive innovation's trajectory intersects with the trajectory of performance demanded by the core or the mainstream market, marked by a star (see, e.g., Adner, 2002; Yu & Hang, 2009).

At this stage, sizeable incumbents' customers begin adopting the disruptive product. The process may take years or decades. It took over 30 years for minicomputer manufacturers to develop sustaining revenues for the incumbent mainframe computer manufacturers. Similarly, Kodak has failed to leverage the digital photography revolution, despite being the first to introduce the technology (Lucas & Goh, 2009). Thus, disruption is not an immediate phenomenon. Some other examples of disruptive innovations are Netflix to Blockbuster's DVD rental business in the USA, Uber to car rental business (but not to taxi business), iPhone to the laptop as the primary Internet access tool (but not to other smartphones) (Christensen et al., 2015). Businesses should always be alert to new technological advances and make the necessary adaptation as early as possible.

Theory of Disruptive Innovation

Christensen (1997) introduced the Theory of Disruptive Innovations (disruptive technology) and argued that technologies with inferior quality entering the lower end market could displace established incumbent companies over time. The theory has significantly impacted business practices and has aroused plenty of debates in academia (Yu & Hang, 2009).

Figure 3. The Disruptive Innovation Model



Christensen (1997) described the theory of disruptive technologies as a process whereby an entrant company that has developed a new “disruptive” product at a lower price and lower performance fills the needs of the lower market segment, which the incumbent companies originally served.

Meanwhile, the incumbent companies are willing to let go of their lower-end market segment and focus on making better products for a better profit margin to capture higher-end customers.

Eventually, the “disruptive” product would improve its quality and performance to meet higher customer demands with better pricing. Simultaneously, the incumbent companies will again abandon the lower margin segments for the new entrant and migrate to serve customers with even higher margins.

Christensen discussed many actual business cases whereby the incumbent companies were eventually driven out of the market by the new entrant companies. Christensen (2000) quoted some example industries, such as steel mills, computer disk drives, hydraulic excavators, minicomputers, desktop computers (PCs), laptops, inkjet printers, and Honda motorcycles. He found that disruptive technologies mainly occur in the B2B market. Christensen & Raynor (2003) have widened applying the theory beyond physical goods to include services and business model innovations.

Christensen and Raynor (2003) observed that historically, many profitable growth segments had been initiated by disruptive innovations. They claimed that the best way for a new startup to challenge its established competitors is by disrupting them. However, it should be noted that some innovations are not disruptive; they are sustaining innovations by improving on existing products or services.

Christensen and Raynor (2003) have differentiated disruptive innovation from sustaining innovation in the following manner: “Disruptive innovations, in contrast, do not attempt to bring better products to established customers in existing markets. Rather, they disrupt and redefine that trajectory by introducing products and services that are not as good as currently available products. However, disruptive technologies offer other benefits typically, they are simpler, more convenient, and less expensive products that appeal to new or less-demanding customers”.

In other words, disruptive products tend to be smaller, simpler, and cheaper but more reliable than their predecessor. It generally has lower margins and growth figures compared to existing products (Chris-

tensen, 2000). It is important to note that a disruptive innovation needs not to be principally supreme in performance or quality. However, Christensen (2006) did admit that the disruptive phenomenon that was initially called “disruptive technology” can be misleading since it is the business model in which the technology is deployed that “kill” the incumbent companies, and not by the technology alone. Hence, Christensen considered calling it a “disruptive business model,” as it is an important improvement to the theory since it heavily involves business model innovations.

Another improvement to the theory is to view the disruption effect as a relative phenomenon. It should be measured relative to the business model of another firm. A disruptive relative business model innovation of one firm can be sustaining relative to another firm. Hence, relative is a crucial concept in the theory of disruption (Christensen, 2000). For example, selling computers over the Internet is a sustaining innovation for Dell, but for Compaq, HP, and IBM, which focused on the retail computer business, it can be regarded as disruptive (Yu & Hang, 2009).

Christensen (2006) improved the definition further by emphasizing that disruption is a process, not immediate destruction. Disruption may take a while to manifest its effects. Christensen & Raynor (2003) pointed out that the theory is not wrong even if the disrupter does not instantly kill the incumbent company. Some industries may take decades for the effects to work their way through, but a few years might suffice in some cases.

Initially, Christensen (2000) pointed out that disruptive innovations only captured the lower market segments of incumbent companies. However, later, Christensen & Raynor (2003) amended to recognize two approaches to disruptive innovations, low-end disruption, and new-market disruption. Christensen (2000) highlighted that it is essential for the management to identify the competitive threat and respond effectively, as Intel did with its Celeron Microprocessor (Christensen, 2006; Euchner, 2011). Therefore, a disruptive innovation need not necessarily capture the entire market or completely displace the incumbents. It may begin by just expanding the market to form a new segment of its own.

WeChat Disruptive Innovation Model

In China, the payment industry was dominated by traditional commercial banks, card brands UnionPay, and third-party payment companies. Generally, the traditional payment ecosystem involved the cardholder, card issuing bank, merchant, and the merchant acquiring bank. UnionPay is the monopolistic card network facilitating the payment network in China.

The third-party payment service provider is a licensed non-bank payment facilitator.

Generally, there are three types of licenses, (i) online/mobile payment, (ii) point of sales, and (iii) pre-paid card. These companies were initially created to facilitate e-commerce payment. Alipay is one of the leading third-party e-commerce payment companies. However, due to increasing smartphone penetration, third-party payment companies have been expanded to include P2P payments. WeChat Pay is presently the dominant P2P payment service provider in China.

In March 2016, Citi Research (Citi GPS, 2015) stated that the success of third-party payment companies in the mobile e-commerce sector is due to the following factors.

1. Underdeveloped banking system – Commercial banks are slow to respond to the rapid development of e-commerce, allowing third-party payment companies to capitalize on the opportunities to offer a more convenient, faster, and reliable digital payment solution.

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2. Relaxed Regulation – Regulation on Know Your Client (KYC) is relaxed. The proposal to tighten these regulations was only introduced in July 2015.
3. Convenience – P2P payment integration is simpler than interbank transfer.
4. Security – Escrow account reduces the potential e-commerce fraud. A third-party payment company protects the transactions between buyer and seller.
5. Very Low Fees – Minimal or no charges are imposed on P2P payments.

Conceptualizing the disruptive impact of WeChat Pay

WeChat Pay, with its large user base and comprehensive utilization among individuals, merchants, and government, has transformed the social payment phenomenon in China. After few years of initiating the payments via WeChat, around 84.7% of WeChat users have tried red packets, and over 58.1% have used WeChat Pay for payments (WeChat Report, 2016). In Figure 4, we conceptualize how WeChat Pay enters the incumbent market (retail banking) and captures the P2P payment market segment. WeChat Pay imposes no fees on P2P money transfers, and the payment process is far more convenient than any commercial banking system. As a result of this, WeChat Pay is “forcing” retail banks out of the P2P or social payment business.

WeChat Pay offers more than just the means to transfer money between peers. The app was also integrated with many third-party services, such as taxi, bill payment, and recently used for various purposes. Users can conveniently make payments to these service providers or retail merchants. After launching, 53.6% of WeChat users have chosen WeChat Pay as the preferred mode of payment instead of paying by cash or card (WeChat Report, 2016). In China, many offline retailers, such as restaurants and shopping outlets, accept WeChat Pay as a mode of payment due to its ease of use, large user base, and low merchant transaction fees. Recently WeChat pay is one of the leading players in the market. Furthermore, WeChat users can open up a mobile micro store, “WeiDian,” and sell small products. Mobile commerce is thus made easy via WeChat Pay.

After few years, to further capture the higher-end retail banking of the personal loan market, Tencent has opened its first online bank in China, WeBank, in early 2015. WeBank offers personal loans to online customers with an average loan size of RMB20,000 to RMB200,000. The interest lies between 7 - 18% per annum. WeChat micro-store owner with good selling records was also eligible to apply. The KYC process was made simple, thus making it easier for users to receive loan approval. Even though WeBank was still operating in its early stage, it was evident that Tencent was preparing to enter the personal saving and quick loan market in due course.

Generally, the retail banking market comprises four different customer or product segments based on the product margin or profitability. Higher-end markets consist of customers seeking personal savings and personal loans with higher margins, while at the lower end are less demanding customers and less profitable products, such as P2P payment and merchant payment. Most banks will impose charges to any fund transfer between bank accounts. On the other hand, the WeChat P2P payment transfer service was free of charge, and the fund was received instantly. The P2P payment was easy to use, and generally, all WeChat users would have the e-wallet function once they link it to their bank accounts. Hence, WeChat Pay successfully entered the lowest end of the retail banking market with a simpler and free service. The banks’ small amount of remittance service was disrupted. WeChat Pay keeps on innovating and moving up its performance trajectory by providing merchant payment service. The service was provided for “free” to merchants. Once again, WeChat Pay had “disturbed” the banks’ existing debit/credit card merchant

terminal business. At this stage, it was also important to note that WeChat Pay innovation had extended to include an automated vending machine, which did not belong to the banks' original market segment. Therefore, WeChat Pay disruption co-occurred to the banks' low-end and new market.

In 2015, Tencent Inc. was awarded China's first Internet private commercial bank license, which they call WeBank. WeChat and WeBank are linked through their parent company, Tencent Inc. However, the disruptive potential of their strategic alliance would be a great concern to the traditional banking industry. WeChat customer base was larger than any single conventional bank in China. Hence, WeChat Pay sustaining innovation was potentially disruptive to the entire retail banking industry in China.

Mobile Payment

The payment system used for business activities has been greatly dependent on developing technologies (Internet, social networks, mobile phone, etc.). The progress of mobile payment varies by country in terms of penetration. The adoption rates are marginal, especially in western countries, with the traditional cash and card payment systems still ahead of this advanced payment mode. The low adoption rates may be caused by several factors, such as the availability of multiple payment alternatives, banks dominance, government regulation for e-money licenses, and innovative capabilities and strategic behavior, especially from MNOs (De Reuver et al., 2015), and the lack of interoperable mobile payment platforms, which increases the adoption costs for both the merchants and consumers. Many experts regard mobile payment as the future "killer" application in the mobile communications industry (Ghezzi et al., 2010; Hu et al., 2008; Ondrus & Pigneur, 2020). Mobile payment may be defined as confirmed payment transactions via mobile phones (Weber & Darbellay, 2010) or a solution utilizing mobile devices to make transactions, e.g., banking transactions or paying bills (Gerpott & Kornmeier, 2009). In other words, it means the completion of payments and transactions between two parties in a fast, convenient, safe, and simple way, anytime and anywhere, using a mobile device. This mode of payment provides more advantages compared to using the usual point-of-sale system. Some of its advantages include increased versatility, a large number of mobile phone penetration, faster transactions, greater convenience, and safer and lower fees. The widespread use of mobile phones revolutionizes society due to its social and economic impacts (Guo et al., 2010). Businesses should leverage the opportunities offered by this new medium. In this study, we focus on applying mobile payment tools within the virtual social network – namely "Social Payment."

Social Payment

Social media in financial services typically tend to focus on three key areas, which are (i) marketing, (ii) customer service & (iii) social collaboration (Jegher & Greer, 2014). However, new trends whereby banks scattered worldwide show their willingness to experiment with banking through social media such as Facebook.

Customers are constantly demanding better services at minimum cost, while businesses need to develop innovative ways of creating value to meet customer demands. This often requires innovative enterprise architectures and advanced IT infrastructures (Saranya & Gunasri, 2013). Mobile devices and Internet have become a new delivery channel to facilitate banking transactions for both customers and banks. The Internet offers convenient, faster access and round-the-clock availability. E-banking has

brought new possibilities for banks to meet customer demands (Chavan, 2013). Among these e-banking options, social payment is a form of possible e-banking tools.

This creates the new concept of social payments under digital payment methods and allows people to exchange money without revealing sensitive financial information. Mainly social payments take place via smartphone. The transaction involved phone numbers, usernames, or email addresses rather than financial information. Considering this, we can define “Social Payment” as “a payment made by a virtual social identity through the use of a mobile communication app.”

In the definition, the main emphasis is on three components, includes “social communication app,” “virtual social identity,” and “digital payment.”

Virtual Identity

Google Chairman Eric Schmidt once said, “Identity will be the most valuable commodity for citizens in the future, and it will exist primarily online.” This statement has been proven true in the context of social payment. In any social communication app such as WeChat, a user is assigned a virtual social identity (e.g., WeChat ID). The mobile phone number is initially used to create a user account, and the user can freely rename it to any WeChat ID. A unique QR code WeChat ID is simultaneously generated. Every WeChat user can be distinctively recognized via its unique personalized QR code ID. Such identity helps WeChat identify the individual user and track his/her activities, including spending behaviors in real-time. Leveraging big data technology, WeChat will analyze these behaviors and provide personalized information service to users.

Typically, users installed more than one social communication app on their smartphones and formed different social groups based on their social status or function. In China, the most commonly use social payment app is Alipay & WeChat Pay. Users may have different social payment IDs corresponding to different mobile phone numbers. Presently, one of the essential security features for social payment is the mobile phone number (or SIM card), followed by the personalized 6-digit security payment code for WeChat Pay. Multiple social payment apps will establish a social payment exchange, which is similar to a bank exchange, whereby digital money can be transferred across multiple social payment platforms.

Apart from personal social payment, transactions can be made via dynamic QR code ID to include machines or “things.” In China, “things” are getting QR-coded. QR code is extensively applied in vending machines, point of sales, advertisements, and signboards. Since a QR code is unique to its application, it forms an important part of the digital connectedness for social payment. In the case of WeChat, combined with its massive user base and wide usage of offline QR code, the Internet of Things (IoT) revolution is expected to begin in China.

At the beginning of the pandemic, WeChat Work collaborative work platform launched a live streaming function to enable users to initiate live streaming, conduct online meetings, and share with WeChat customers. Travel retailers DFS “DFS T VIP Club Mini Program” established its membership program within WeChat to converts overseas brick-and-mortar shoppers into online members and allowed users to continue using various member-only services following purchases. Besides, DFS has to create online sales channels, “Friendly Shopper,” allowing users to make purchases on products offered at the offline store via the official DFS WeChat account. Then, users send a link of the purchase to shoppers overseas to assist them in picking up the purchased items at the DFS store. This process is designed to increase shopping at DFS stores for Chinese consumers unable to travel (Berthiaume, 2020).

The evidence shows that compare to offline payment volume in Europe, which dropped because of travel bans, online payment has grown, particularly for e-commerce merchants. This results from setting up cross-border direct-mail online stores through WeChat Mini Programs and leveraging products in the WeChat ecosystem. Through WeChat Groups, Official Accounts, and live streaming, many European retailers have successfully connected with Chinese consumers and help recovery to businesses in the time of the Covid-19 pandemic (CISION, 2021).

To attract Chinese tourists WeChat Mini Program (a sub-application embedded within WeChat) is launched by Singapore Tourism Board and targeting Chinese MICE (Conferences and Exhibition, Meetings, Incentives) travelers. It is known as 'MeetSG' and allows Chinese MICE travelers to buy tickets to leisure spots such as Sports Hub, Gardens by the Bay, and Sentosa with WeChat Pay (Phua, 2021).

CONCLUSION

This chapter discussed the impact of digital technologies on a payment system and the transformation in customer behavior. Digital technology and its usage in payment systems transformed the payment systems in most countries and changed how businesses execute their social commerce strategy. The implementation of digital technologies in payment systems creates the new concept as FinTech or financial technology, which is the innovative financial products and services enabled by ICT. The new payment ecosystem with different stakeholders impacted individual and merchant's behavior, how people exchange money, send gifts, and even how beggars ask for money. Social apps have dominated the present mobile data communication trends and changing peoples' behavior in staying in touch. Social commerce, social payments, and financial technology (Fintech) create new opportunities and challenges for different parties involved, particularly the banking system.

Usage of WeChat Pay and Alipay has become a daily gesture in China. The use of credit cards in China is sporadic, if not non-existent. WeChat Pay has evolved from a simple communication app to a service meeting with 1.225 billion monthly active users' use video calling. Its strategy is to extend its services to various financial products, from insurance to investment funds. The apps currently support nine currencies, and WeChat partnered with an international payment technology company (Adyen) to facilitate access to China for foreign companies. Mini programs reside within WeChat and can be accessed on-demand to perform various functions like ride-hailing, food ordering, ticket purchasing, and more. The COVID-19 pandemic accelerated Mini Program while the number of active mini-program and mini-programs with transactions increased by 75% and 68%, respectively, in 2020 (CISION, 2020). SMEs and brands connect with users via Mini Programs and WeChat pay, and the annual transaction generated from Mini Program more than doubled year-on-year in 2020. More than 100 million people purchased via WeChat Mini Program, including fresh fruit and vegetables, in 2020. WeChat mini-games get popular. The Zhifufen (a feature similar to the credit score on WeChat pay) experienced 240 million users in 2020. It boosted the conversion rate of e-commerce orders by 14% and the repurchase rate of retail merchants by 73%. The Zhifufen enable post-payment after receiving delivery and refund. Moreover, in 2020, there were 80,000 enterprise WeChat partners, increasing year-on-year growth by 400%.

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Chapter 8

An Applied Analytics Approach for Facility Location Optimization in Logistics With Actionable Insights for Logistics Managers

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ABSTRACT

The structure of logistic distribution networks is one of the most strategic topics in industrial facility management. This study aims to optimize the logistics structure of the LPR company in Portugal by utilizing the applied analytics methods. In doing so, both locations of facilities and structure of the logistics networks were considered as the target of the optimization process. After analyzing the 12-month historical data of the studied company with more than 8,000 customers and drop points, the optimized logistics structure and warehouse locations were determined that could deduct the logistics costs by 22%. To this end, a linear optimization algorithm was developed to identify the optimum logistic structure among more than 20 million possible network configurations. The proposed solution is applicable in the other industries with logistics operations, helping the managers to make data-driven decisions.

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INTRODUCTION

The recent advances in information technology and smart devices allow users to collect, aggregate, store, communicate, and analyze enormous pools of data, known as “big data” (Gandomi and Haider, 2015). In this digital era, data has been introduced as the new oil which needs to be refined by a combustion engine called Analytics. Facing such a tsunami of data, it is essential to apply the appropriate analytical methods to gain actionable insights and help managers making data-driven decisions (Beheshti, Benattallah, & Motahari-Nezhad, 2016). Big data analytics is revolutionizing a wide range of industries, and logistics is one of them. The complex and dynamic nature of logistics, along with the huge size of data generated by information management systems in this domain, make logistics a perfect use case for the applied big data analytics (Emrouznejad, 2016).

Big data analytics is now a reality in the logistics optimization processes since it allows supply chain managers to have data-driven decisions, based on real, accurate, and real-time information. Nevertheless, there is still a lot of work to be done, since the logistics companies are now starting to understand the full potential of the data that they have stored in their servers. This is the opportunity to develop research projects in partnership with companies so that both partners can fully use the potentials in practice.

In this industrial applied analytics research, a mathematical optimization model was utilized to analyze the logistics data and detect the optimum locations for the facilities. To this end, a linear programming (LP) optimization algorithm is applied to minimize the transportation costs for the studied logistics company. The experimental results reveal that the proposed optimized model could deduct the logistics costs by 22% compared to the existing logistics network.

About LPR

In this applied analytics research, La Pallet Rouge (LPR) was selected as one of the biggest logistics operators in Portugal. LPR is a pallet pooling company for the Fast Movement Consumer Goods sector, founded 25 years ago, has a € 236 million turnover and is part of the Euro Pool Group (EPG), which includes Euro Pool System with a € 385 million turnover, generating a combined annual turnover of € 621 million.

Over more than 25 years, Euro Pool Group has developed into the leading logistics service provider of reusable standard packaging in Europe [4], becoming the standard in the supply chain for fresh and packaged food. On a daily process, producers, transporters, processing companies, and retailers benefit from the advantages of EPG reusable trays and pallets. By exchanging knowledge, experiences, and ideas with each other and with customers, EPG has created space for innovation and synergy throughout the entire chain. EPG solutions provide a fully outsourced pooling service to ensure efficient and reliable transportation of fresh products. Producers receive EPG trays whenever and wherever they need them. After collection, trays are checked, sorted, washed, and repaired where necessary, before they are reused in another rotation, ensuring a perfect packaging in each new flow. Based on Circular Economy principles and sustainability focus EPG also provides solutions that integrate their facilities and equipments inside their customer and retailers' facilities. With this integration, the entire supply chain becomes more efficient and eliminates unnecessary transport kilometers, reducing a considerable amount of CO₂ emissions.

Recognized for its red pallets, they provide efficiency, simplicity, and sustainability throughout the supply chain. It has a network of more than 125 warehouses in 15 countries (Figure 1), occupying a leading position in Europe. They handle around 92 million pallets a year, offering a complete range of

services to the entire supply chain: producers, distributors, logistics operators, and retailers. LPR covers all Western Europe through a network of warehouses that manage the delivery, collection in more than 28000 drop-off points, sorting, and repairing of pallets.

The entire European market is covered by 8 subsidiaries (LPR Homepage). Each branch has a dedicated team that manages all local operations: services for customers, logistics, pallet pooling management, etc. LPR has a common and unique SAP-based IT system applicable to the entire group, which means that LPR can ensure the same service and quality to all customers in Europe (LPR Portugal Homepage).

In a world of constant evolution and mutation, the adaptability of organizations becomes not only a critical factor but also mandatory. And being this valid for organizations in general, for the logistics area, the criticality is even greater, as not only is there an increasing pressure to reduce deadlines, lead-times, and costs, as well as complexity and demand for quality and additional/complementary services. In this context, the decision-making process itself cannot be delayed or postponed but must be taken as soon as possible, in order not to compromise operations, ensuring also its compliance.

Over the past few years, LPR has been experiencing not only the complexity and requirements described above but also strong growth in its activity and consequent revenue (Figure 2). One of the direct impacts of this strong and continuous growth was the inability of the current structures, namely the logistics centers, to support the current volumes and market quality and technical requirements and specifications.

Like other companies, it is up to LPR to provide itself with the means, resources, and equipment necessary to satisfy the needs of its customers (current and future ones). In this sense, there was a need - among others - to move from a logistics center in the central region, initially in Mealhada, to a new and larger logistics center with a “great” location, considering especially the distances between the customers’ factories and the destination points of the pallets; the unit cost of each collection and the cost of square meter concerning the future installations.

This research aims to find the optimal location for the new logistics centers in LPR Portugal. To this end, data of the last 12 months of logistics transactions between LPR facilities and DP/Customers were collected and analysed using the exploratory analysis and optimizations methods. Furthermore, the actionable insights gained in this project could help LPR managers with reducing the distances between LPR facilities and DP/Customers, having shorter collection and delivery lead-times, reducing distribution costs, and reducing the warehouse square meters in unit costs.

Background

Over the years, several research works have shown the importance of logistics operations optimization (Shu, 2010; Dharmapriya & Kulatunga, 2011; Moeller, 2011; Karasek, 2013; Dotoli, Epicoco, Falagario, Costantino & Turchiano, 2015; Boonmee, Arimura & Asada, 2017). Most of the studies have been focused on two of the main sources of logistics costs: warehousing and transportation. Moeller (2011) reports that the usage of Line sequence Optimization (LSO) in the picking processes inside the warehouse can reduce the total time of the operation. Karasek (2013) shows how the application of Vehicle Routing Problems (VRP) to warehouse operations improves the overall performance of the logistics operations. Additionally, the usage of Automated Guided Vehicles (AGV) has shown an important increase in warehouse efficiency.

Figure 1. Facilities location of Euro Pool Group

Source: Euro Pool Group Sustainability Report 2019

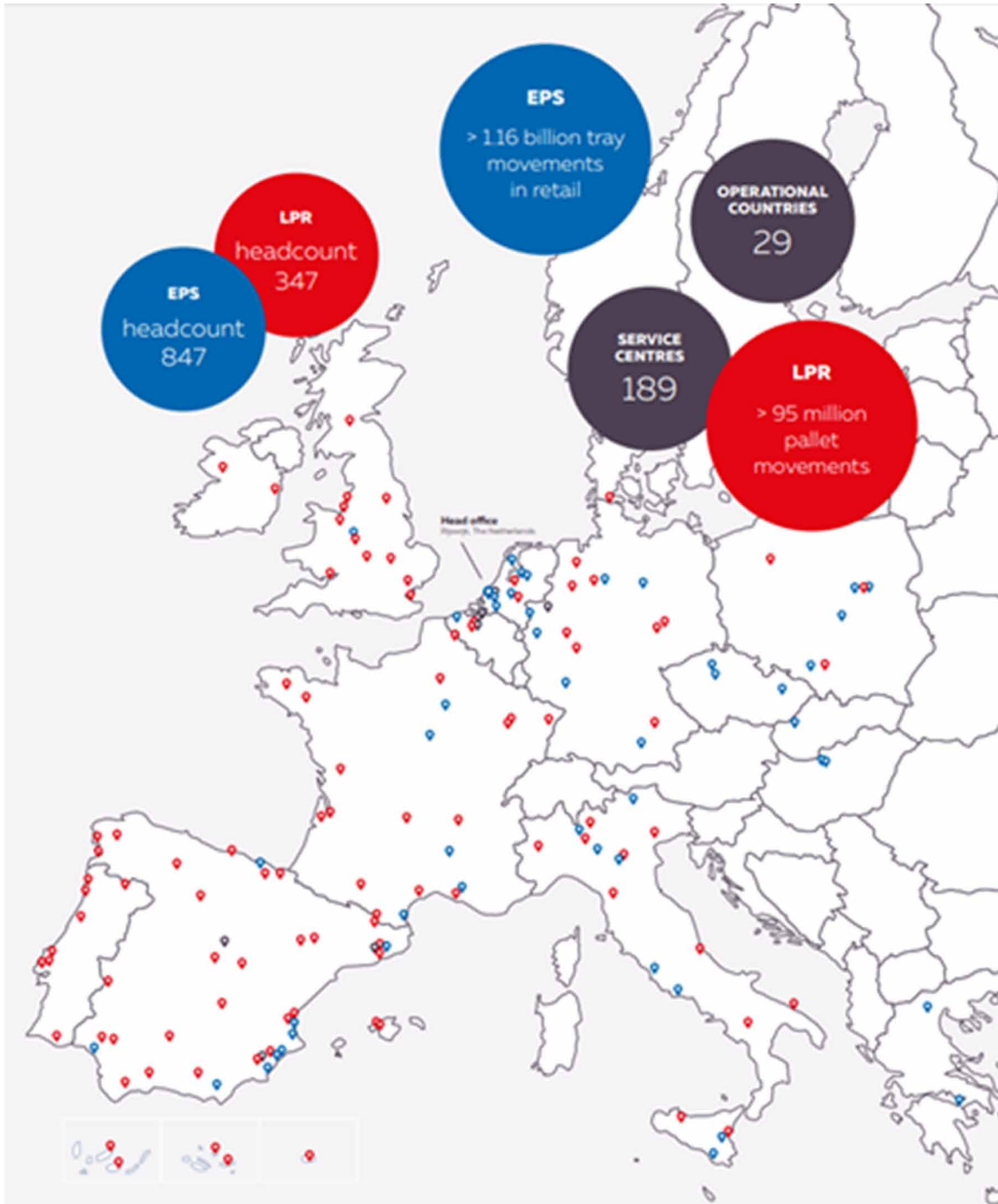
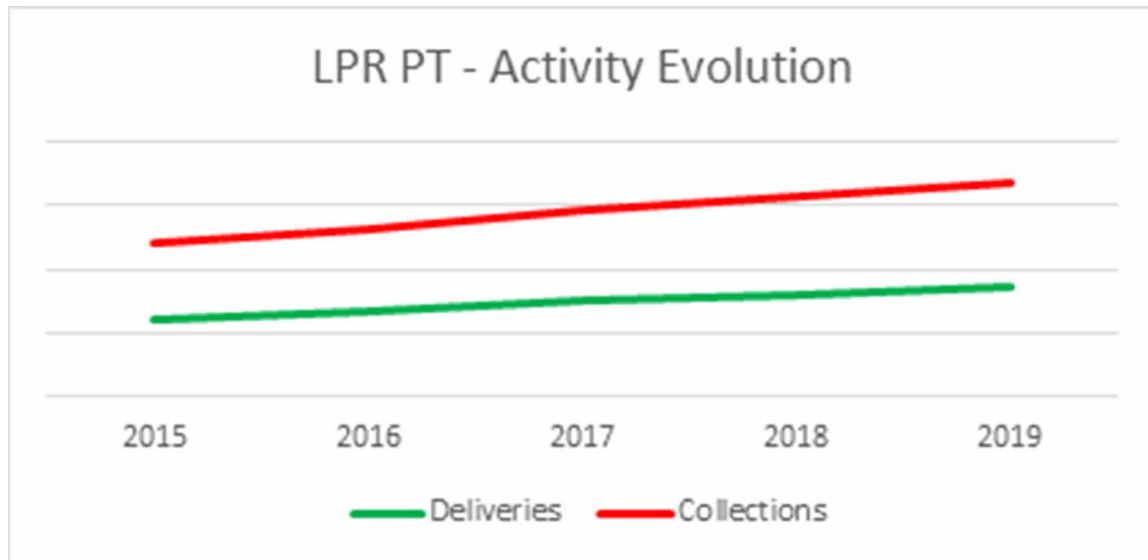


Figure 2. LPR Portugal evolution of the pallet's movements

Source: LPR Portugal Homepage



Dotoli et al. (2015) presented an integrated approach to warehouse analysis and optimization, with the use of several lean tools, to reduce the inefficiencies in warehouse operations, in an integrated and interactive framework. Dharmapriya and Kulatunga (2011) also shows how lean tools can be applied to warehouse operations, specifically in the layout definition and material handling techniques. The study applies a heuristic approach to determine the optimal allocation of each category and has proven usefully with a 30% reduction in the total travel distance.

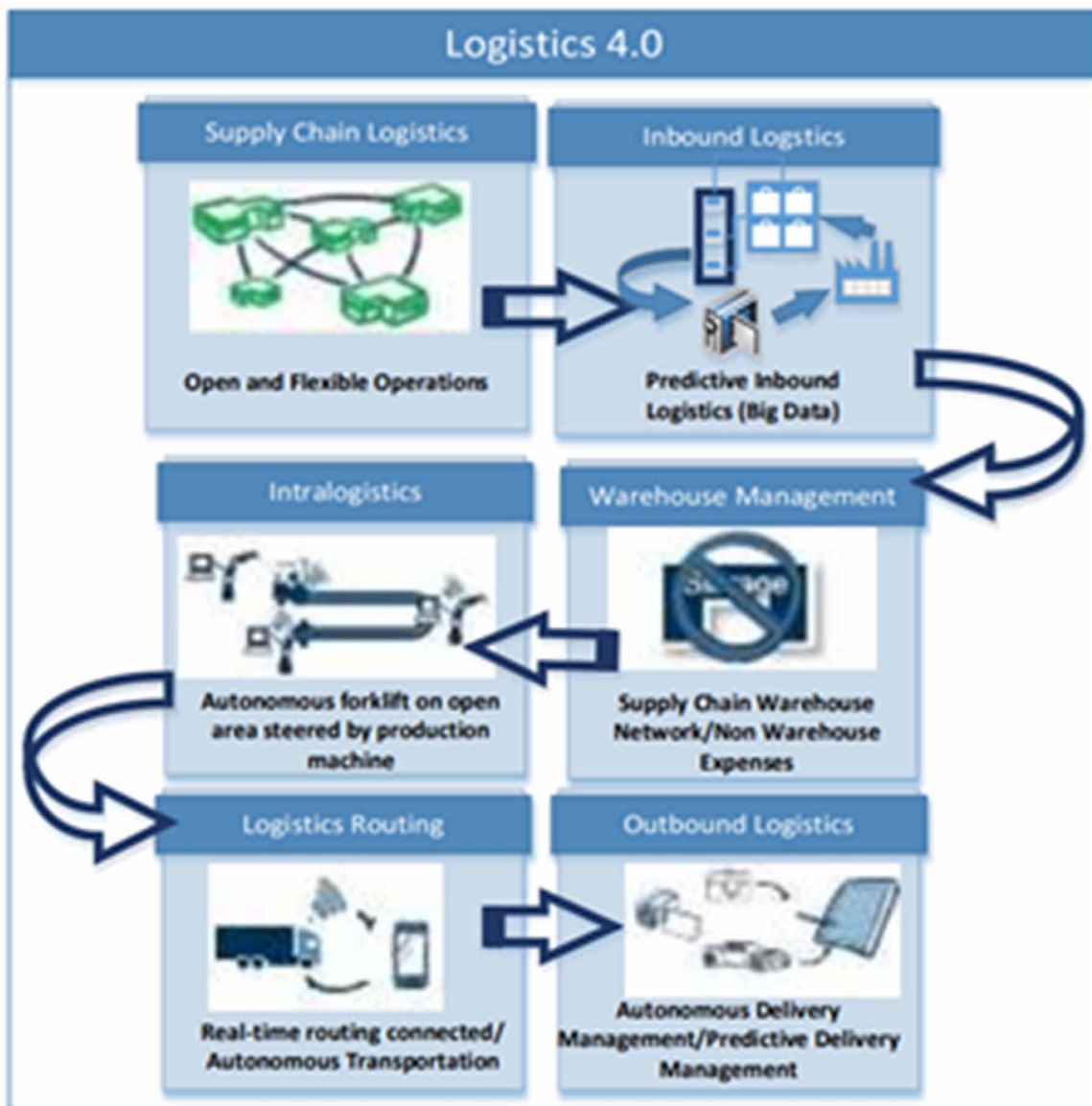
But, nowadays, the complexity of the logistics operations requires looking at the entire supply chain to gain a competitive advantage over the competitors. The Logistics 4.0 is the recent paradigm for supply chain managers (Figure 3), with the new trends starting to appear all over the supply chain: accessibility, autonomy, global network, and digitalization, amongst others (Strandhagen, Vallandingham, Fragapane, Strandhagen, Stangeland & Sharma, 2017).

Additionally, the focus of Logistics 4.0 is making the supply chain more sustainable, to accomplish the Sustainable Development Goals (SDGs), namely: 9 – Industry, Innovation, and Infrastructures, 11 – Sustainable Cities and Communities and 12 – Responsible Consumption and Production (UN Sustainable Development Goals).

To improve the supply chain performance, there are several Information Technologies (IT) tools that have been developed: RFID, IoT, Big Data, Data Analytics, amongst others. Radio Frequency Identification (RFID) is an IT tool that allows the logistics players to identify the products without having to scan the bar code, thus not requiring a direct line to the product. This tool improves efficiency in all the logistics operations (Wamba & Chatfield, 2010), and some big retailers have already implemented it in their stores (Decathlon; Walmart and RFID). Internet of Things (IoT) is now appearing as an important tool to help the companies to monitor and improve their processes, with considerable gains in terms of visibility and efficiency in the supply chain (Wang, 2016). The more important features of IoT are context (the possibility to interact with a device), omnipresence (since the devices will all be connected), and

optimization (associated with the usage of the devices) (Witkowski, 2017). The large amount of data gathered with these devices will allow us to apply Big Data solutions in optimizing the logistics operations. Zhong et al. (2016) present an innovative application of RFID and IoT in shop floor logistics with Big Data and Cloud Manufacturing.

Figure 3. Supply Chain Management Processes of Logistics 4.0
Source: Wang (2016)



Supply Chain Analytics (SCA) and Big Data Business Analytics (BDBA) are two topics addressed by Wang et al. (2016), which are key concepts to improving Supply Chain operations from a global

perspective. These concepts allow the organizations to analyze and measure the performance of the several logistics areas within the company and sets the benchmark for the value-added operations. With the ability to monitor on regular basis, SCA will help the companies to access the processes with low performance and identify the root causes, allowing the managers the opportunity to make better decisions to improve the business processes.

Companies face a huge challenge since they have big sets of data with large volume, velocity, variety, and veracity (Govindan, Cheng, Mishra & Shukla, 2018), and variability (Yudhistyra, Risal, Raungratanaamporn & Ratanavaraha, 2020). Thus, making Big Data Analytics an important tool to help companies improving their global supply chain by reducing costs and risks. Big Data can be of several types: messages, images, global positioning system (GPS) signals from cell phones, readings from sensors, etc. (Grazia-Speranza, 2018). Having all this information is important to reduce the carbon footprint of the logistics activities since the percentage of empty trucks on the road is between 15% and 30% (Grazia-Speranza, 2018).

Considering this, the companies need to decide about the location of the facilities, since it has an impact on the travel distances. This is a problem that has been studied for a long time. Boonmee et al. (2017) show that facility location problems have been applied to a wide range of emergency humanitarian logistics, since 1950, and present the characteristics of the four types of models: deterministic, stochastic, dynamic, and robust. Additionally, Shu (2010) presented a model that simultaneously makes the location, distribution, and warehouse-retailer echelon inventory replenishment decisions. More recently, Guo (2020) presented a smart logistics model based on big data, with a special interest in the definition of logistics platforms for e-commerce.

The linear optimization algorithms have been applied in several studies in the logistics domain. Fan and Wang (2018) presented a new model for the joint optimization of lot and warehouse sizes. They developed an efficient algorithm which outperforms the commercial solver CPLEX. In other research, a distribution network model of the certain enterprise was designed the in order to optimize unit transport costs (Stopková, Stopka & Klapita, 2017). Ang and Lim (2019) showed the impact of optimizing classes through a series of numerical experiments with real data. They proposed a novel approach called the FB method to solve the optimization problem. The FB method is suitable for general receiving-dock and shipping-dock locations that may not coincide. In the context of RFID-enabled flexible warehousing, Zhou et al. (2017) proposed a Flexible configuration by relaxing both location constraint and local capacity constraints with a periodically renewable global capacity. They could track both inventory items and mobile warehouse equipment at the item level.

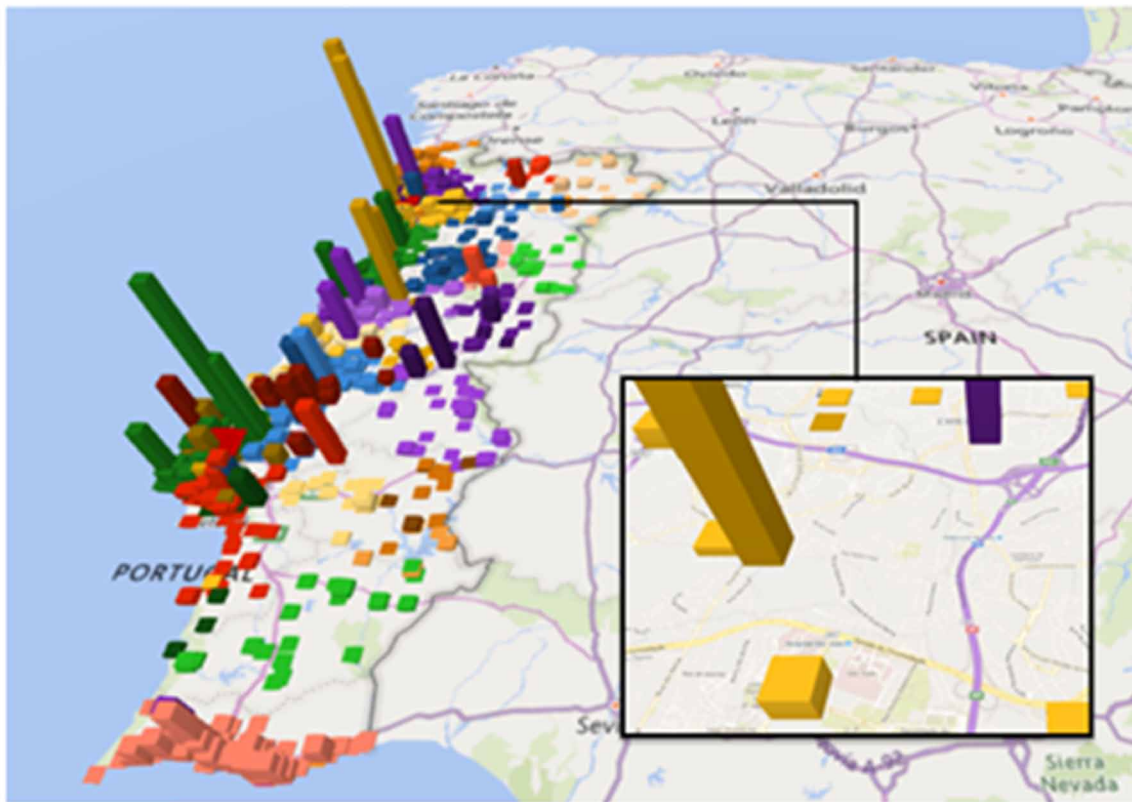
Data Preparation and Exploratory Analysis

After conducting the requirement engineering meetings with LPR logistics managers, it was decided to study the last twelve months of all logistics transactions to visualize the existing logistics network and find an optimum configuration to identify the best locations for the warehouse. In doing so, 6906 records of logistics transactional collected including all deliveries and collections of the last twelve months, along with the projected needs of the customers and drop points in the next year. After cleaning the data, the final datasets were generated comprising the historical logistics records of 2513 drop points and 305 customers.

One of the key data fields in studying the logistics networks is the location of facilities. In the LPR dataset, all address fields were provided in the textual format which was not appropriate for visualization

of the logistics network structure in geo maps. To address this issue, we utilized the Google Geolocation API and developed some modules to map all textual addresses into geographical coordination. The results were promising according to the LPR managers. Figure 4 illustrates the results that show the location of LPR customers and drop points in details of street names. There are three main hubs of logistics operations in the North (Oporto), the Center (Lisbon area), and the South (Algarve). The walkthrough facility is also provided in this map and users could filter it by selecting the Customers and Drop points as well.

Figure 4. Visualization of LPR facilities using the Geolocation analytics methods



The Optimization Model

Optimization modeling is one of the most popular techniques in applied analytics projects which covers a very broad range of applications including the logistics and supply chain management systems. Aiming to find the best possible configuration for decision makers, the optimization models are also called Prescriptive or Normative models. In this context, Mathematical Programming solves the problem of determining the optimal allocations of limited resources required to meet a given objective that must represent the goal of domain experts and decision makers. For instance, the resources may correspond to people, machinery, materials, money, or land. Out of all permissible allocations of the resources, it is desired to find the one or ones that maximize or minimize some numerical quantity such as profit or cost.

This study aims to determine the optimal configuration of logistics networks and facility locations to minimize the logistics costs for LPR Portugal. In this model, the Deliveries and Collections Costs were considered as two main elements of the logistics costs. Deliveries are identified as the transportation from warehouses to the customers. And vice versa, Collections are considered as the logistics to collect the rented pallets from the pickup point and transporting them back to the warehouses.

$$LPR \text{ Logistic Cost} = \sum_{w=1}^W \sum_{c=1}^C \text{Delivery Cost}_{wc} + \sum_{w=1}^W \sum_{d=1}^{DP} \text{Collection Cost}_{wd} \quad (1)$$

W: number of suggested warehouses (2,3,4,5,6,7 and 8)

C: number of customers (305)

DP: number of drop points (2513)

DeliveryCost = (Number of trucks) * (Euclidean distance)

CollectionCost = (Number of Collection) * (Euclidean distance)

The objective of the optimization model is to minimize the sum of delivery and pickup costs in the considered logistics configuration. The number of warehouses is considered as the constraint. As presented in the next sections, the optimization modeling algorithm run for different configurations of two to eight warehouses.

To implement the designed optimization model, the OmpR package (Schumacher, 2017) was used in R Studio as an open-source optimization modeling package that is applicable in solving Mixed Integer Linear problems. This package simulated all possible configurations with more than twenty million different structures and then suggested the optimum solution in terms of location of warehouses and structure of deliveries and collections. The details of the optimization results are discussed in the next section.

DISCUSSING THE RESULTS

As the existing configuration, LPR Portugal logistics network comprises five main warehouses. LPR managers were interested to know if their logistics facilities are in the optimal locations, or there some better configurations to deduct their logistics costs. Furthermore, what will be their logistics costs if they plan to increase or decrease the number of their warehouses.

So, in this applied analytics study, we simulated all possible configurations from two to eight warehouses to analyze the logistic costs and determine the best configuration of logistics facilities. Figure 5 depicts the six optimal configurations generated by analyzing the previous twelve months of data.

Due to the high level of data involved in this process, it was clear since the beginning for LPR management team that internal capability and resources to process it in an efficient and accurate data would not be possible. In this way throughout the results, LPR management team were able not only to have a better and clear view of internal data, allowing a better understanding of the current situation but also to foresee the different solutions which will turn LPR operations more efficient both on the logistics and financial point of view. This has become an important decision-making process tool once that allows a decision based on real metrics and not perceptions, which quite often leads to wrong decisions/results.

Figure 5. The optimal locations of LPR facilities in six different configurations

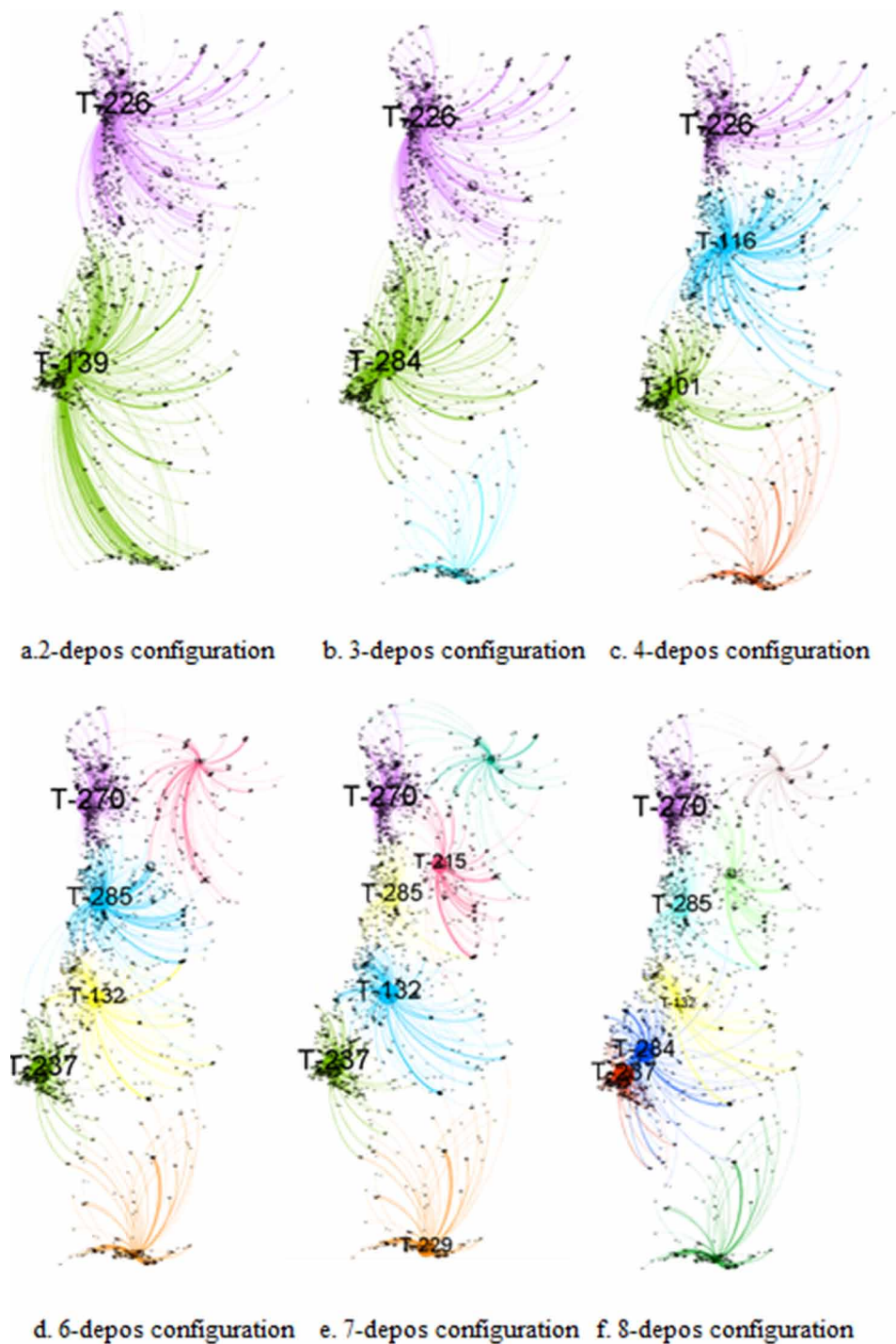
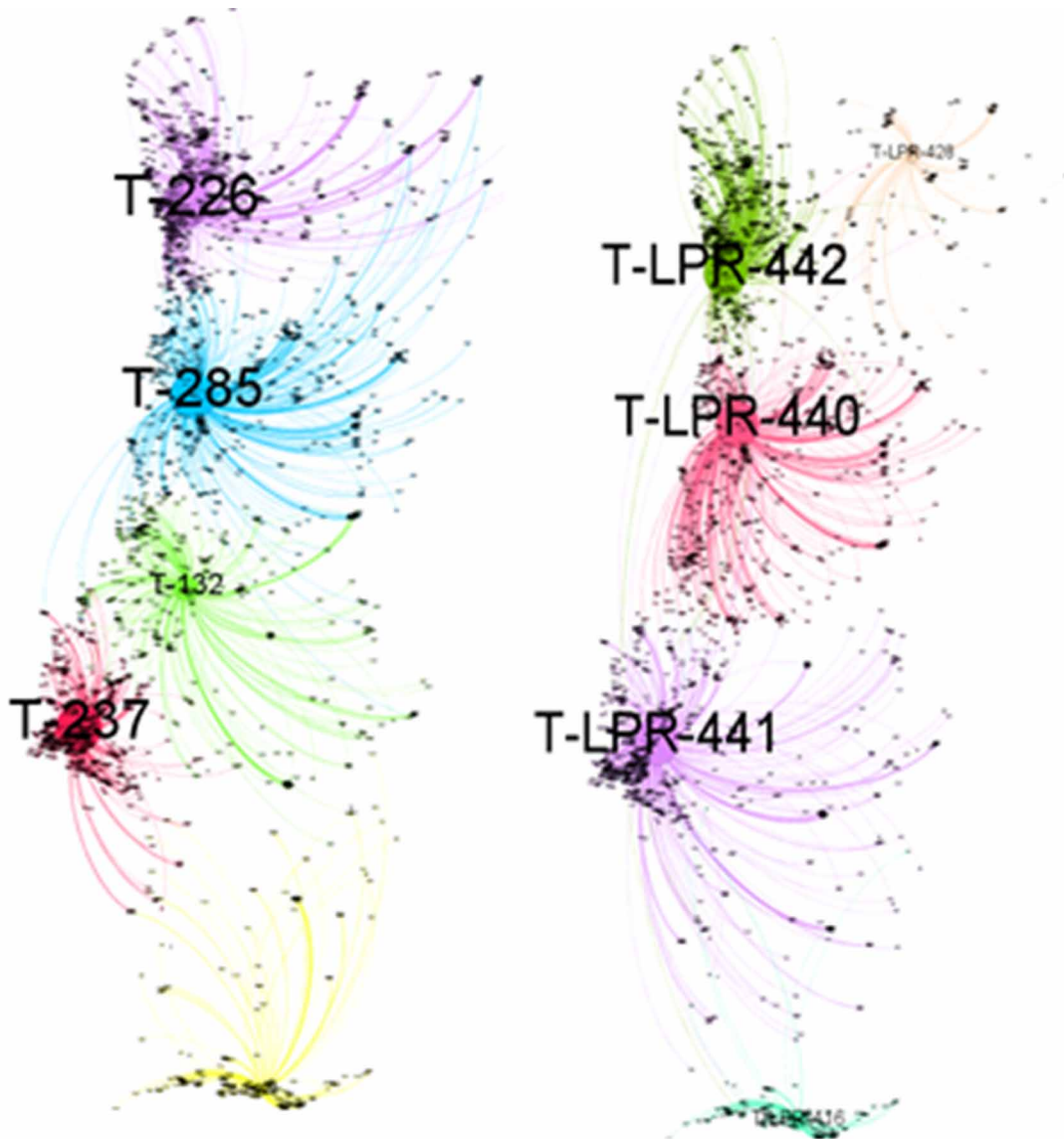


Figure 6. Comparing the optimal (left) and existing (right) logistics networks of LPR Portugal



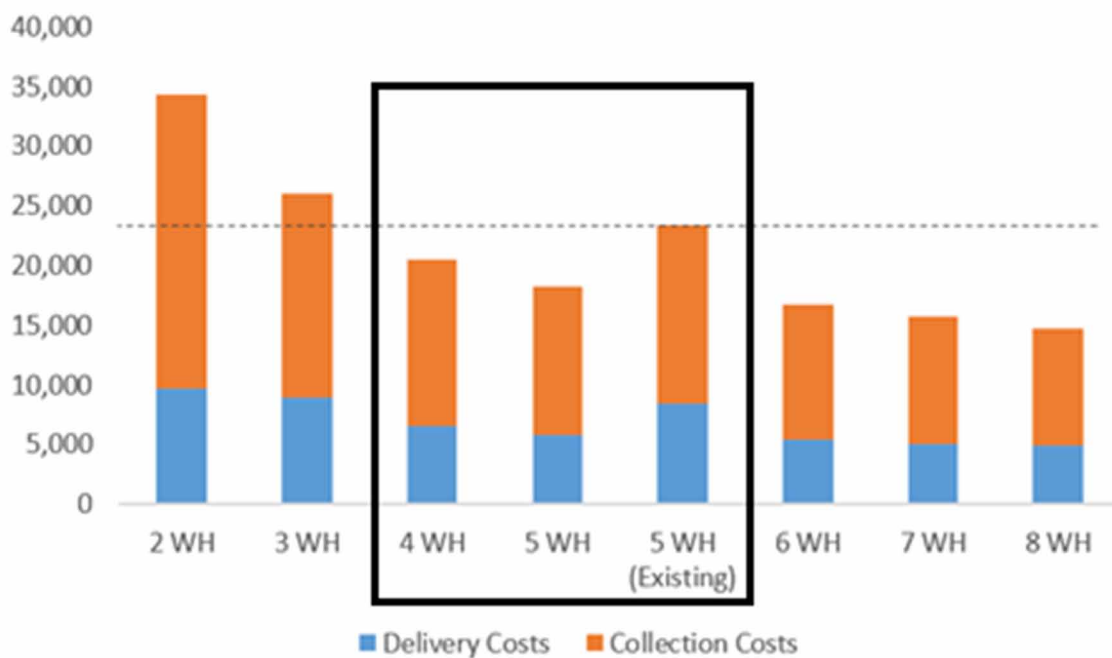
The tool developed allows the managers to have a multi-scenario approach, allowing them to have the opportunity to make data-driven decisions, with real historical data.

Optimizing the location of the existing five warehouses was one of the most important insights that LPR managers were looking for it. In Figure 6, the existing structure of the LPR logistics network is depicted on the right side. On the left side, we can see the optimal network suggested by the built optimization model in this study. A comparison of these two graphs reveals that it's suggested to move the T-LPR-428 warehouse from the north-east to the central area (T-132), and, also, shift the T-LPR-442 a little bit to the north (T-226). In the next paragraph, we can see that these suggested relocations along

with some minor corrections of the whole network significantly improved the LPR logistics network by deducting the transportation costs by 22%.

After finding the optimal locations of warehouses in each identified logistics structure, it was important to financially compare the different structures to help LPR managers in making data-driven final decisions about the numbers and locations of their warehouses. In doing so, a cost index was identified as the sum of collections and delivery costs between each warehouse and connected customers and drop points. Afterward, the total costs of each logistics network structure were calculated as shown in Figure 7.

Figure 7. Financial analysis of different logistics configurations for LPR Portugal



The above figure illustrates how the suggested optimal logistics structure could help in deducting the transportation costs in LPR Portugal. The horizontal line shows the actual costs of 23,339 units in the current five-warehouse configuration, which is not optimized. At the immediate left side of this bar, there are two optimal configurations of five-warehouse and four-warehouse logistics networks, with calculated costs of 18,211 and 20,537 units, respectively. So, a comparison of these three configurations reveals that by just restructuring the existing logistics networks with the same five warehouses, LPR can improve their logistics costs by 22%. Also, they can even close one of their warehouses to have a 12% saving in transportation costs, besides having the rental and operation costs of the removed warehouse.

CONCLUSION

In recent years, Data has evolved dramatically in volume, variety, velocity, and veracity. Such rapid growth of volume and complexity of data might be the direct result of growing mobile applications, cloud computing, IoT, and AI. Facing such a tsunami of data, it is quite important how to analyze them and gain actionable insights to have data-driven societies and industries. Big Data Analytics, as one of the main pillars of Industrial Revolution 4.0, plays an important role to transform the different industries towards being data-driven. In this momentum, the logistics industry is positioning itself to utilize this new enabler to improve the operations and optimize the transportation networks, towards the Logistics 4.0.

In this study, we applied analytics and mathematical modeling to propose a solution for optimizing the logistics network in LPR Portugal, as one of the largest logistics operators in Portugal. To this end we collected and cleaned the whole historical data of the logistics operations in the previous twelve months, to utilize them in building the optimization model. A mixed-integer linear optimization algorithm developed using the OmpR package with an objective function of minimizing the combination of delivery and collection costs. This model generated and compared more than twenty million possible configurations and then suggested the optimal logistics structure. The financial comparison of transportation costs of the existing and proposed optimized logistics network in LPR Portugal reveals that the proposed optimization model could significantly improve the logistics costs by 22%. Also, according to another suggested optimal configuration with four warehouses, they can have at least 12% deductions in their logistics costs by closing one of their warehouses and restructure the logistics network based on the suggested model. As an applied analytics industrial research project, the actionable insights gained in this project can be extended to all other industries with logistics operations such as manufacturing companies, retailers, shipping, and transportation firms.

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Chapter 9

Internationalization, Company Value Creation, and European Funds

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ABSTRACT

In recent years, the business environment has become increasingly complex, creating additional risks for companies to manage, resulting from globalization, technological innovation, market competitiveness, more demanding consumers, and changes in companies' ownership structure, presently also due to the pandemic situation. In dealing with this situation, EU funds should play an essential role. Thus, this research study aims to analyze the impact of EU funds on Portuguese companies, considering the companies that have benefited from European incentives under the Qualification and Internationalization Incentive System, since it is directed to financing investments in strategic areas to business success such as internationalization and innovation. Therefore, the sample includes the companies that had projects approved in 2015 and aims to show the impact of these incentives on value creation capacity, as well as employment and internationalization level in the years from 2016 to 2019.

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INTRODUCTION

Increasing markets' globalization has led to increased technological innovation, competitiveness, more demanding consumers, and also transformation in the organizations' ownership structure, originating an increase in mergers and acquisitions. Facing an increasingly challenging scenario, companies become more susceptible to risk and uncertainty. To manage the many challenges, management needs to outline and implement successful strategies. Thus, strategy planning, as well as financial performance assessment, are determining factors for management.

Presently, value creation has been revealing significant relevance in the business environment since it makes it possible to ascertain the companies' ability to pay all its investors, including equity owners and financial institutions, unlike traditional measures based on profit.

This increase in interest regarding value creation derives from a change of focus from mere profit and profitability analysis. The current understanding is that profits can only lead to a company's wealth and long-term sustainability if they are enough to repay the cost with total invested capital, whether from equity owners or financial partners thus creating value (Neves, 2011). So, authors like Assaf Neto (2014) and Bhasin consider value creation to be one of the main objectives of any company.

In the last decades, Portuguese companies have benefited from EU funds with the purpose of enhancing competitiveness and capability to create value considering the increasingly international context. However, as relevant as the subject may be, empirical studies regarding the impact of receiving such funds it is not significant, quite the contrary. Presently, with the ongoing pandemic situation and the expected massive negative impact on organizations, employment, and the economy, this is issue got even greater magnitude.

The purpose of this research study is to determine the impact of European funds that finance investments directed towards internationalization strategy, on financial value creation, internationalization capacity, and employment level, on Portuguese companies.

Thus, for the purpose of the study, a sample of Portuguese companies that benefited from the European incentives under the Qualification and Internationalization Incentive System in the fiscal year 2015 will be analyzed. This choice stems from the fact that this Program is directed to financing investments in strategic areas to business success, such as internationalization and innovation. The aim is to verify the impact on internationalization level, as well as on value creation capacity and job creation.

With this in mind, data consisting of economic and financial values of the fiscal years 2015, 2016, 2017, 2018 and 2019, will be analyzed using several statistic techniques, such as hypothesis test for differences between means.

The remainder of this chapter is structured into three sections: the theoretical framework, regarding the importance of internationalization, highlighting its relationship with innovation and financial performance, the assessment of financial performance based on value creation and the capital cost concept; the empirical study, featuring a more detailed purpose of the study and research methodology and the analysis and discussion of research results; and finally, the conclusion.

THEORETICAL FRAMEWORK

Internationalization as an Important Corporate Strategy

With the overall markets' globalization being the current trend, the geographical operations' location becomes a competitive advantage, key to a successful business strategy. Companies are no longer limited to their domestic markets, so expansion is a viable strategy.

The internationalization process has gain prominence in business activity, which according to Knight and Cavusgil (2004), is due to two factors: the increasing economies and markets' globalization, that made global businesses easier, based on consumer preferences around the world, simplifying production processes the establishment of different markets' positions; increase in technological information and communication innovation, optimized production, logistics operators and transportation processes, decreasing the costs associated with global business, thus maximizing the return with business internalization.

Although this study's aim is not to perform an extensive literature review, the importance of internalization in business success is pretty clear and has inspired extensive research in the last decades.

Internalization contribution in companies' success stems from several reasons: profiting from core competencies and competitive advantages developed in their domestic markets; increasing savings due to location advantage facilitating access to raw materials or cheaper production factors; increasing scale economies; and reducing production unit costs by expanding to different and more attractive markets (Altaf & Shah, 2015; Freire, 1998).

Therefore, internalization is an appropriate business strategy when business economic viability is in question. Noteworthy is also the way that company chooses to internalize. The internationalization process can be slow and difficult, involving considerable resources. This is not a unique process; rather, it depends on business activity, company characteristics like size and age, as well as the availability of resources involved (Knight & Liesch, 2016).

Internationalization and Innovation

The process by which firms internalize involves several stages. Authors like Johanson and Wiedersheim-Paul (1975), Johanson and Vahlne (1977), Bilkey and Tesar (1977), Cavusgli (1980), Reid (1981), Czinkota (1982), Andersen (1992), Hennart (2014), Bruneel and De Cock (2016) consider that the internalization stages take into consideration the markets' knowledge and the ability to allocate resources and can be summarized in the following steps:

- Steps 1: No regular exports, domestic market consolidation;
- Steps 2: Export through independent local representatives;
- Steps 3: Establish sales subsidiaries in foreign target markets;
- Steps 4: Establish subsidiaries in foreign target markets that include all business phases.

These steps suggest that companies' internalization is an incremental process increasing their involvement in foreign markets gradually (MacKov, Curci & Yagi, 2013).

Regardless, recently some organizations contradict the internationalization models developed by Johanson and Wiedersheim-Paul (1975) and Johanson and Vahlne (1977), it is the case of companies that internationalize at inception or shortly after, they are the Born Global Firms (BG) and International

New Ventures (INV) concepts (Hennart, 2014; Schueffel, Baldegger & Amann, 2014; Zander, 2015; Bruneel & De Cock, 2016).

BG are business organizations that, from their inception, start the process of internalization aiming to gain competitive advantages in using resources and selling their products in several different markets, without establishing previous domestic market consolidation (Coviello 2015; Ribau, Moreira & Raposo, 2018). In turn, INVs, are considered as business organizations that, from their beginning, seek to obtain competitive advantages based on their internal resources and sales in multiple foreign markets (Furtado et al., 2019; Fernandes et al., 2019).

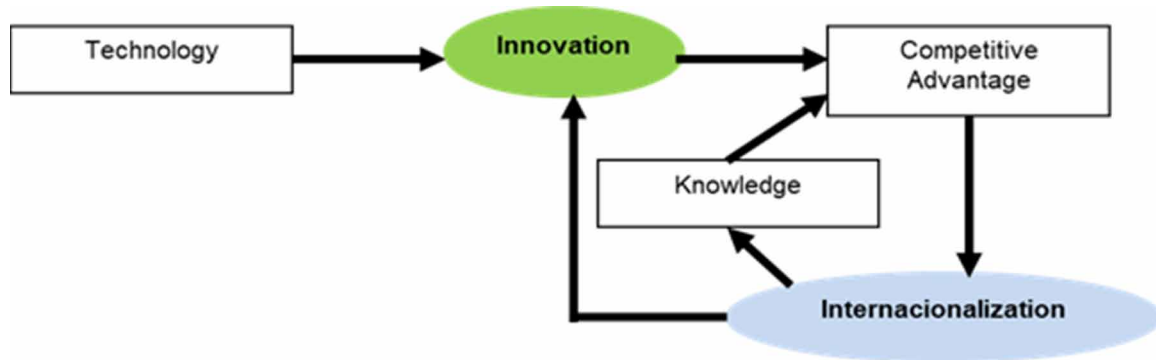
Although different, these two types of companies, according to (Filipescu, 2006), have something in common: substantial competitive advantages in innovation. Therefore, it appears to exist a clear relationship between internationalization and innovation. Thus, several research studies emerged on this relationship that focused on two perspectives:

- International Performance of countries and industries: the most relevant results reveal that technological innovation is critical to internationalization capacity. This is clearly explained by the fact that technological knowledge is a source of competitive advantage between countries favoring those in a better position, also contributing to the internationalization of their industries (Soete, 1987; Fagerberg, 1988; Dosi et al., 1990; Boitani & Ciciotti, 1992; Meliciani & Pianta, 1995; Archibugi et al., 1996; Olejnik & Swoboda, 2012; Beugelsdijk et al., 2018);
- International Performance of companies: aiming to understand the impact of innovation in internationalization. In this perspective, results are not always consensual. The research studies performed by Hirsch and Bijaoui (1985); Ito and Pucik (1993); O'Farrell et al., 1993; Kumar and Siddharthan (1994); Braunerhjelm (1996); Merino and Brown (1996); Rodriguez (1999); Melle and Raymond (2001); Eusébio and Rialp (2002), Filipescu (2006), Kafouros et al. (2008), Furtado et al., 2019 and Fernandes et al., 2019, reveal a strong correlation between innovation and internationalization. Contrary to the research conducted by Willmore (1992), Wakelin (1998), Lefebvre et al. (1998), Alonso and Donoso (1998), Sterlacchini (1999), and Valenzuela (2000), did not reveal any relationship between innovation and internationalization. According to Filipescu et al. (2009), the lack of relationship stems from the fact that in most cases, innovation is measured by research and development expenses, which several companies, especially the smaller ones, choose to consider as an operating expense, thus not properly reporting these expenses.

Figure 1 represents the relationship between innovation and internationalization, highlighting their competitive advantage and cause-effect relationship. Internalization is a learning process, so as companies' internationalization evolve will enable a better understanding of the target markets and their characteristics, contributing to logistic processes improvement and a better understanding of consumer needs, to better target them (Filipescu et al., 2009; Vlacic, González-Loureiro & Eduardsen, 2019).

Figure 1. Relationship between innovation and internationalization

Source: Adapted from Filipescu (2006)



Despite mixed results, innovation is an aspect of differentiation since innovative countries, industries, and companies, will quickly become a reference in their respective fields through the know-how they possess and the new solutions they offer.

Also important in internalization are the networking relationships established. Johanson and Vahlne (2003), in a new study that revised their earlier model, the Uppsala model (based on international markets' fluctuations) highlight the importance of obtaining information and knowledge by establishing networking relationships, both with customers and suppliers. Market knowledge is fundamental in internalization development, and knowledge increases with commitment to target foreign markets (Paul & Gupta, 2014).

Due to its importance, this Network-based Theory was also contemplated in their first model, since networking is fundamental in establishing partnerships that help companies better identify business opportunities in international venues without requiring any incremental process (Johanson & Vahlne, 2003). International networks positively influence the company's exploratory capabilities creating innovation, with a strong impact on market performance (Lew et al., 2013).

Networking activities strategically aligned with key partners have also been revealed to be a key factor explaining Small to Medium Enterprises' (SMEs) success with internalization (Ratajczak-Mrozek, 2014).

The Impact of Internationalization on Business Financial Performance

Companies trading in international markets have several benefits, as mentioned; however, they also have increase exposure to several risks. According to Altaf and Shah (2015), these risks can relate to the lack of knowledge of foreign markets during the early stage of internalization and increase of costs such as transaction costs.

Thus, several research studies attempt to understand the connection between internationalization and business financial performance. Nevertheless, results regarding the impact of internationalization on company performance are inconclusive as they offer no consensus; some studies have not even found a relationship between internationalization and performance.

In the studies carried out by Buckley et al. (1977), Kumar (1984), Morck and Yeung (1991), and Gerpott and Jakopin (2005), the authors found no evidence of cause-effect between internationalization and performance. The studies performed by Brewer (1981), Siddhartan and Lal (1982), Michel and Shaked (1986), Chang and Thomas (1989), Collins (1990), Dragun (2003), Lu and Beamish (2006) reveal a

negative correlation between internationalization and business performance. However, the most common results are the ones reported in the studies performed by Vernon (1971), Errunza and Senbet (1981), Kim and Lyn (1987), Grant (1987), Dunning (1988), Grant et al. (1988), Geringer et al. (1989), Czinkota and Wongtada (1997), Lu and Beamish (2001), Hsu (2005), Chiao et al. (2006), Elango (2006), Kuivalainen and Sundqvist (2006), Martinez (2006), Bausch and Krist (2007), Pangarkar (2008), Hsu and Pereira (2008), Zeng et al. (2009), Kiederich and Kraus (2009), Fernandes et al. (2019), Furtado et al. (2019), in which the authors found a performance improvement due to increasing internationalization capacity.

Furthermore, most studies that found a positive relationship between internationalization and performance indicate that success in an internationalization strategy depends on a set of specific characteristics. The results show as relevant characteristics to international success: innovation in production technologies or product, reputation, managers experience in internationalization, know-how transfer to subsidiaries, logistics efficiency, cooperation with local authorities (knowledge of the market, operators, and inputs) or with national companies who shared logistics resources, marketing and facilities to the target market (Harrigan, 1988; Geringer et al., 1989; Czinkota & Wongtada, 1997; Wolff & Pett, 2000; Lu & Beamish, 2001; Chiao et al., 2006; Elango, 2006; Martinez, 2006; Chiao et al., 2008; Hsu & Pereira, 2008; Kafourous et al., 2008; Slangen & Hennart, 2008; Kiederich & Kraus, 2009; Fernandes et al., 2019; Furtado et al., 2019).

In addition, several studies report that internationalization only improves business performance to a certain point. As internationalization increases, costs associated with management complexity and a greater diversity of operations will progressively and negatively affect companies' profitability (Rumelt, 1974; Daniels & Bracker, 1989; Geringer et al., 1989; Sullivan, 1994; Hitt et al., 1994; Ramaswamy, 1995; Al-Obaidan & Scully, 1995; Belkaoui, 1998; Gomes & Ramaswamy, 1999; Hsu & Boggs, 2003; Martin & Papadopoulos, 2006; Kumar & Singh, 2008; Lavie & Miller, 2008; Cadogan et al., 2009).

Several studies also explore the importance of country characteristics. The country where the company trades may play a major role in the financial success of the internationalization strategy. These studies indicate that countries that encourage internationalization and have more available resources in areas like technological knowledge and innovation are more prone to facilitate successful internationalization strategies (Wan & Hoskisson, 2001 and 2003; Wan, 2005; Elango & Sethi, 2007; Hennart, 2014).

According to what has been discussed, it is possible to conclude that internationalization strategy may be a key factor in business performance success. Therefore, it should be carefully outlined, integrated into the company's overall strategy considering its specific competencies and competitive advantages. So, it is crucial that the internationalization entry mode is carefully planned, supported by a detailed analysis of market potential for each target country.

Financial Performance Assessment

According to Teixeira and Amaro (2013), financial performance assessment reflects management decisions in the various areas of the company. It, therefore, shows their impact on the company's ability to generate profitability, on the relationship between profitability and investments made, on the company's ability to generate cash flow, and also its financial long term sustainability.

Traditionally, financial performance measurement is performed with the information provided by accounting in the main Financial Statements: the Balance Sheet, Income Statement, and Cash Flow Statement (Teixeira & Amaro, 2013).

However, according to Assaf Neto (2014), currently, there is a grown interest in value creation. Performance management assessment changes from a conventional posture of mere analysis of the ability to generate profit and profitability to a focus on value creation.

Value creation becomes the company's main objective since it is no longer sufficient for a company to be sustainable in the long term to generate profits; the profit must exceed the expected return required by all investors; that is, it should exceed the total investment cost. Therefore, the company's management should adopt strategies aimed at value creation maximization. The focus is the improvement of systems that encourage top managers and their respective business units to maximize the ability to create financial value, who are acting in a business universe more diversified and complex, thus ensuring the financial sustainability of the company and the creation of wealth for its investors (Teixeira & Amaro, 2013).

Thus, it is fair to say that financial performance is an essential instrument for management control, ensuring the company's survival as it reflects the impact of management decisions on the company's ability to create value. Adequate information is key to the management decision-making process.

Although the focus of management should be value creation, traditional analysis of financial performance is still relevant to appraise the company's economic and financial situation. Traditional analysis is still an important way of financial diagnosis but is no longer considered enough to adequately evaluate the strategies defined (Neves, 2012).

Thus, regarding financial performance assessment, the main advantage of value creation over traditional analysis is the consideration of the expected return of the equity owners in the capital cost and therefore providing a comprehensive overview of the company's true ability to generate profitability and of its financial stability (Assaf Neto, 2014; Teixeira et al., 2012).

Although, presently, in the financial literature, one can find several perspectives using different indicators to assess the company's financial performance, there is still no consensus as to the most appropriate indicators. Therefore, in the study performed by Teixeira and Amaro (2013), the authors refer to a set of different indicators related to value creation organized in the following perspectives: Accounting results, Profitability, and Cash flows.

Value-Based Financial Performance Measures

This study will focus on the overall business capacity to create value, that is, the ability to generate profits higher than the expectation of return required by all investors, including financial institutions and equity owners (Neves, 2012), suggesting different indicators.

Value creation can be measured through the use of indicators that can be classified into distinct categories: Accounting profits indicators, Profitability indicators, and cash flows indicators (Teixeira et al., 2012).

The category of indicators based on accounting profits establishes the relationship between the profit generated with the business activity and the total investment cost. The indicators are Economic Value Added (EVA) and Cash Value Added (CVA), which relate to the companies' ability to generate supranormal profits.

EVA is a value-based financial performance measurement that intends to evaluate management value creation. Value creation occurs whenever the business activity has the capacity to generate profits higher than the total cost of capital invested. It is calculated by subtracting to Net Operating Income After Tax (NOIAT) the total cost of capital invested. Therefore, EVA is the value created by the business activ-

ity considering the opportunity cost of the company's total invested capital (equity owners or financial partners) (Sabol & Sverer, 2017; Neves, 2012).

$$\text{EVA} = \text{NOIAT} - \text{Investment} \times \text{Capital cost} \quad [1]$$

The methodology behind the calculation of capital cost will be addressed later in the chapter.

A positive value of EVA means value creation. The fact that EVA considers all financial costs (debt and equity) in its calculation is the characteristic that best differentiates it from the traditional measures of financial performance assessment like Return On Investment (ROI) or earnings per share (EPS) (Young & O'Byrne, 2001). According to Sabol and Sverer (2017), EVA is one of the most used measures by companies and financial advisors in business performance.

The value-based performance measure CVA is similar to EVA but combines the advantages of the measures based on accounting profits with the cash flow concept (Young & O'Byrne, 2001). Its calculation differs from EVA since instead of Net Operating Income (NOI), it uses Net Operating Means (NOM) (Neves, 2012), that is, CVA is the difference between the company's Net Operating Means (NOM is Net Operating Profits After Taxes plus non-cash expenses) and the total cost of invested capital.

In its calculation, it takes into account non-cash expenses, that since they do not imply any actual cash payment, can be used to self-finance the business. Therefore, by using NOM, CVA reflects the ability to release financial surpluses by the company's core business without the influence of different accounting rules regarding depreciation and amortization, impairments and provisions (Teixeira & Amaro, 2013).

$$\text{CVA} = \text{NOM} - \text{Investment} \times \text{Capital cost} \quad [2]$$

or

$$\text{CVA} = \text{EVA} + \text{Non-cash expenses} - \text{Investment} \times \text{Capital cost} \quad [3]$$

Comparing CVA and EVA shows that its calculation and logic are similar to EVA; nevertheless, Young and O'Byrne (2001) point out that EVA has the advantage to highlight the business ability to generate sufficient financial surpluses to cover all activity expenses.

Supranormal Profitability (SP) and Cash Flow Return On Investment (CFROI) are the selected indicators in the category based on profitability.

SP compares the generated profitability by invested capital and the total cost with invested capital cost, following the principles already mentioned in EVA (Teixeira, 2008). The indicator used as a measure of generated profitability is ROI, as it represents the relationship between profits generated in the activity and the necessary investment made in that same activity.

$$\text{SP} = (\text{ROI} - \text{Capital cost}) \times \text{Investment} \quad [4]$$

As the formula analysis indicates, there is value creation if investment profitability exceeds the total capital cost. The exceeding value, multiplied by the amount of investment, shows value creation capacity in monetary units, resulting in the value of EVA (Teixeira, 2013).

CFROI was created by CSFB-Holt Value Associates and presented as an alternative to traditional measures based on accounting profits. However, it has the disadvantage of being too complex to calculate

(Neves, 2011). The aim is to determine an internal return rate (IRR), which means value creation if it is higher than total capital cost. In this sense, it considers the investment at current value (non-current assets and business working capital needs), the estimated lifetime of the assets, the yearly net operating free means, and the residual value of existing assets (Assaf Neto, 2014; Neves, 2012). The calculation formula is as follows, where values should be considered at current prices:

$$CFROI = - EACP + NOMCP / (1+IRR) + \dots + NOMCP / (1 +IRR)^n + RV / (1 + IRR)^n \quad [5]$$

Where: EACP - Economic assets at current prices; NOMCP - Net operating free means at current prices; RV - Residual value

Due to the complexity and assumptions in its calculation, several criticisms are pointed out to this indicator (Neves, 2011):

1. The impact of adjusting each type of asset with inflation is very subjective, making it difficult to assess its effect in determining value creation;
2. Taking into account the MLOLIPC always constant over the periods is unreal and does not adequately represent the companies' true ability to create financial surpluses;
3. The investment in working capital is not taken into account in the forecasted years, since the assumption is that they do not change, which is also not correct;
4. Thus, an IRR is obtained considering potential income rather than cash flow, contrary to what is described by financial theory.

CFROI is calculated following basic procedures in investment projects decision (Neves, 2011), but is calculated for the entire company, and instead of cash flows, it considers net operating free means. Thus, the aim is to assess the investment's profitability potential, considering the business activity's capacity to free financial surpluses over the expected lifetime of the investment, comparing to capital cost (Venanzi, 2010).

In the cash flow category, Neves (2011) recommends the use of the indicators Economic Value Created (EVC) and Internal Rate of Effective Return (IRRE), which are based on historical cash flows. Therefore, they focus on cash flows rather than accounting earnings to cash flows.

In this case, to measure value creation, it is necessary to consider cash flows generated, investment and account for the cost of invested capital, the expected return required by investors.

Cash flows are considered a powerful financial planning and control instrument compared to profit analysis since they show the business activity's true ability to generate cash flows, since they are accounted for without considering accounting policies such as the ones related to depreciation and amortization, impairments, and provisions or accruals (non-cash expenses) (Esperança & Matias, 2009). Differences in accounting policies regarding non-cash expenses can lead to significant variations in the value obtained for an indicator, making it difficult to compare between companies. Thus, Cash flows represent the company's true cash situation as they are calculated by the difference between total cash inflows and total cash outflows.

To the importance of cash flows analysis, a major contribution was Michael Jensen's (1986) research paper called "Agency Cost Of Free Cash Flow, Corporate Finance, and Takeovers". In this research, the author introduced the concept of Free Cash Flow, highlighting Free Cash Flow to Firm (FCFF) or Operating Cash Flow as fundamental in business valuation.

Free Cash Flow to Firm is the actual cash flow generated, so it measures the surplus of cash created by the company's core business activities after covering investment needs, both in non-current assets and operating working capital needs, regardless of financing decisions (Wang & Li, 2017; Neves, 2012). Therefore, the FCFF can be calculated as follows:

$$\text{FCFF} = \text{NOI} \times (1-t) + D + P - \Delta\text{WCN} - I \quad [6]$$

Where: NOI - Net Operating Income; t - Income Tax rate; D - Depreciation and amortization; P - Provisions and Impairments; ΔWCN - Change in Working Capital Needs; I - Non-current investment (operating activity).

Therefore, FCFF represents financial surpluses generated by the operating activity available for the company to repay the different investors like equity owners and financial institutions and enable activity growth without requiring additional financing.

Finally, according to Neves (2011), EVC calculation is based on capitalizing the various cash flows with the average cost of capital for the last year of analysis, thus allowing to verify if management was able to create value. The formulas for EVC and IRRE are as follows:

$$\begin{aligned} \text{EVC} &= \text{OCF}_1 \times (1 + \text{cost of capital})^{(n-1)} + \text{OCF}_2 \times (1 + \text{cost of capital})^{(n-2)} + \dots + \text{OCF}_n \\ 0 &= \text{OCF}_1 \times (1 + \text{IRRE})^{(n-1)} + \text{OCF}_2 \times (1 + \text{IRRE})^{(n-2)} + \dots + \text{OCF}_n \end{aligned} \quad [7]$$

This methodology using EVC and IRRE is similar in calculation form to the concepts Net Present Value (NPV) and Internal Rate of Return (IRR); thus, it bridges the gap between estimated investments' viability and its implementation control. It offers a measure of performance control based on generated cash flows and considering the required expectation of investors' return, comparable to the estimated values of NPV and IRR during investment decisions.

As discussed above, value creation occurs when the business activity return is higher than the cost of the investment made in the activity. Therefore, regardless of the indicator category (accounting profits, profitability, or cash flows), the aim of a value-based performance measure is always the same: to analyze the business capacity to generate financial means higher than the cost of total invested capital (expected return by equity owners and financial partners).

Regardless of the type of indicator, there is a commonly important variable to obtain, which is capital cost. Its methodology is now further developed.

The capital cost is associated with the minimum return required by investors in an investment considering the risk involved (Assaf Neto, 2014; Young & O'Byrne, 2001). At a corporate level, the concept of the capital cost is associated with financing and investment decisions, that is, where to invest and how to finance the investment pursuing value maximization (Teixeira, 2008)

Investment decisions can be financed through debt financing, and equity and both types of capital have associated costs, depending on the associated risk to investors. Usually, equity owners demand a higher reward due to higher exposure to risk. For example, in case of bankruptcy, they only have access to existing assets after all third parties' obligations are met. Since different types of capital have different costs, the concept of Weighted Average Cost of Capital (WACC) emerged, considering the cost and weight of the different financing sources in the financing structure. Its calculation formula is as follows (Teixeira, 2008):

$$WACC = (E/A) \times Ke + (D/A) \times Kd \times (1 - t) \quad [7]$$

Where: E - Equity; A - Net Assets; Ke - Cost of Equity; D – Debt financing; Kd - Cost of debt financing; t - Income tax effective rate.

Considering its calculation, the optimal capital structure, debt/equity mix, will be the one that minimizes the WACC, reducing capital cost and therefore maximizes value creation. Calculating WACC is an important source of information for management in managing value creation. A management strategy to increase value creation may be considering cheaper financing sources, lowering the cost of capital, and therefore increasing value creation (Teixeira et al., 2012).

The cost of debt financing sources often corresponds to the interest rates negotiated with financial institutions or calculated based on accounting data, dividing the interest expenses in the income statement with financial debt in the balance sheet of the previous year (Neves, 2012).

For listed companies, the cost of equity is commonly estimated through the Capital Asset Price Model (CAPM), which measures the return required by equity based on market profitability and associated risk. The cost of equity can also be estimated by the average Return on Equity for the specific industry or by adding a premium risk to the company's interest rate negotiated with financial institutions (Neves, 2012). Damodaran (2020) suggests using the countries' risk premium as a reference regarding the premium risk.

EMPIRICAL STUDY

European Union Funds in Portugal

The existence of financing programs, as the European Funds, regarding investments oriented explicitly to the internationalization and innovation process, can be very relevant to increase companies' competitive advantages in strategic areas that contribute to the growth of their economic value added and consequently to the sustainability of economies.

The European Commission acknowledges the importance of innovation and internationalization to the companies' success, making it a priority when allocating funds.

Portugal benefited from the Portugal 2020 - PT2020 Program (2014-2020), the Communitarian framework in force until last year. This program involves a Partnership Agreement established between Portugal and the European Commission, through which Portugal received a total of €25 billion by 2020, with the aim of stimulating growth and job creation in the country, aligned with the principles of the Europe 2020 Strategy, which is based on Smart, Sustainable and Inclusive Growth (www.portugal2020.pt, 2018).

Portugal 2020 (PT2020) brings together the five European Structural and Investment Funds (ESI Funds) - the three Cohesion Policy Funds (European Social Fund, European Regional Development Fund, and Cohesion Fund), the European Agricultural Development Fund, and the European Fund for Maritime Affairs and Fisheries (www.portugal2020.pt, 2018). The ESI Funds are the European Union (EU) regional policy financial instruments to fight against asymmetries amongst the various countries and regions, thus contributing to achieve economic, social, and territorial cohesion in the European integration process (www.portugal2020.pt, 2018).

To facilitate the implementation of European funds, with a particular focus on business initiative, *Portaria* No. 57-A/2015 of 27 February, article 3rd approved the Specific Regulation on the Field of

Competitiveness and Internationalization (RECI), defining investment typologies covered by the companies' incentives system provided for in the RECI:

1. Business innovation and entrepreneurship;
2. Qualification and internationalization;
3. Research and technological development.

The objective of the System of Incentive to Business Innovation and Entrepreneurship, according to articles 19th and 20th of RECI, is to boost innovation in Portuguese businesses. This Incentive System seeks production forms for new goods, services, and processes that can support their own progression in the value chain through international markets orientation strengthening. It also aims at technological improvement encouragement, production unit's creation, qualified entrepreneurship stimulation, and investment structuration in new potential growth areas.

The Qualification and Internationalization Incentive System aims, according to Article 40th and 41th of the RECI, small and medium-sized enterprises (SME) competitiveness promoting by increasing productivity, flexibility and responsiveness, and active global market SME presence. It supports investment in dynamic competitiveness factors, including expenses with internationalization strategies, industrial property, brand creation, laboratory capabilities creation or strengthening, organization and management, information and communication technologies' implementation, quality, environment, innovation, digital economy, amongst others.

The Incentive System for Research and Technological Development defined in Articles 60th and 61th of the RECI consists of research and technological development projects (R&DT) and technological demonstration, led by SME, and can be developed in cooperation with National Technical and Scientific System entities. These projects shall involve industrial research and or experimental development activities, leading to new products, processes, or systems' creation to the introduction of significant improvements in existing ones.

Managing Authorities of Operational Programs or other competent entities oversee reviewing all the applications, serializing them, and punctuating them according to each contest criteria. Applications whose decision is favorable have access to two types of EU support: non-reimbursable grants and reimbursable allowances, usually with several years of a grace period and the possibility of being partly transformed into non-reimbursable if the applicable foreseen economic targets are met.

Research Objectives and Methodology

The general purpose of this study is to ascertain the impact that EU funds generated on Portuguese companies' financial value creation and internationalization.

According to the results shown in the literature analyzed, as well as the outlined strategy of Portugal 2020, EU funds are expected to have a positive impact on Portuguese companies by increasing profitability creation, as well as higher employment level and internationalization capacity. The expectation of positive impact is supported by the theory that better access to capital promotes easiness in obtaining strategic investments' financing, which in turn promotes the companies' competitive advantages and long-term sustainability.

The study sample refers to the companies that received EU funds under the Qualification and Internationalization Incentive System in 2015 and includes a total of 228 companies.

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The choice to analyze companies that benefited from this incentive stems from the fact that these funds are intended to finance expenses specifically related to internationalization, such as, purchase of machinery and equipment for new operational processes, purchase of computer hardware and specific software for new organizational processes, research on international markets, international marketing and prospecting campaigns (flight and hotels), travels by importers to learn about the company's offer, international promotion (promotional material – catalogs, mailings, telemarketing, databases, creation of newsletters,...), expenses with industrial property and acquisition of patents and licenses, presence in fairs (stand rental, stand operating costs and services charged by the event organizers), quality certifications (products, processes and company), registration on industry electronic platforms, implementation of institutional websites, creation of own brands, staff training costs and salary costs with the hiring of highly qualified human resources (level 6 of qualification). The Qualification and Internationalization Incentive System is the fund directed to internationalization financing, so it is the most appropriate to measure the impact stemming from internationalization strategies.

The data analyzed consists of economic and financial values of the fiscal years 2015, 2016, 2017, 2018, and 2019 of the companies in the sample. Since due to the conditions of the incentives received, the companies had 24 months to invest, the study focuses on the companies that received the funds in the fiscal year 2015, expecting that the following fiscal years, particularly 2017, 2018, and 2019 show a positive impact on value creation of the companies in the sample.

The data sources are the Portugal 2020's website to obtain the list of companies that received incentives in 2015. Also, the SABI database - Iberian Balance Sheet Analysis System to obtain the economic and financial data of the selected companies.

Thus, considering all the aspects mentioned above, four research hypotheses were formulated:

- H1:** In the years 2016, 2017, 2018, and 2019 EVA value is significantly higher than in the year 2015.
- H2:** The number of employed people in 2016, 2017, 2018, and 2019 is significantly higher than in 2015.
- H3:** The level of internationalization in 2016, 2017, 2018, and 2019 is significantly higher than in 2015.
- H4:** The allocation of EU funds has a positive relationship with financial value creation, job creation, and internationalization capacity.

For the reliability of the research, next, the indicators used to assess the companies' value creation are described.

To measure value creation capacity, EVA was the value-based performance measure chosen. This choice is based on EVA's easiness to assess value creation given that it only requires information provided by the financial statements for its calculation, so easily obtained.

In EVA calculation, the business profit is represented by Net Income Without Financial Leverage as business profits (NIWFL), including all economic flows associated with operating activity, excluding the impact of management financing decisions. Its value is obtained with the following formula:

$$\text{NIWFL} = (\text{NOI} + \text{Financial income}) \times (1 - t) \quad [8]$$

Where: NIWFL – Net Income without Financial Leverage; NOI – Net Operating Income; t - Effective Income Tax rate

The invested capital (represented by total net assets) refers to equity plus liabilities, as reported in the companies' annual balance sheets.

The cost of capital was determined through the weighted average cost of capital (WACC), which considers both the cost of equity and debt capital. Its calculation involves the following variables: effective income tax rate (t), cost of debt capital (K_d), cost of equity (K_e), and total invested capital (equity + liabilities).

The effective income tax rate was calculated by dividing the value of income tax expense by the Net Income Before Tax (NOIBT), shown in the income statement (Neves, 2011).

Debt cost was obtained through the quotient between interest expense mentioned in the income statement and the value of financial debt mentioned in the balance sheet for each fiscal year (Neves, 2011).

Equity cost was calculated by adding a premium risk to debt capital cost previously obtained. According to the values available on Aswath Damodaran's (2020) website, the risk premium was obtained relatively to countries' risk. For Portugal, the premium risk considered is 4.86%.

The data analysis is performed using statistical techniques. To characterize the selected sample, descriptive statistics were used to better understand the companies' economic and financial position.

In hypothesis 1, it is intended to determine if there are significant differences in EVA values for the years 2016, 2017, 2018, and 2019 compared to 2015, so tests for the difference between means for paired samples (t student and Wilcoxon tests) are used. These tests analyze the values of EVA, as well as the different variables involved in its calculation, namely NIWFL, investment and WACC. This way, it is intended to get a clearer view of what impacts the financial value creation of the companies of the sample when comparing 2015 with the other analyzed years.

For hypotheses 2 and 3, the statistical technique is also means' differences tests (t student and Wilcoxon tests) to compare two paired groups, that is, to determine if employment and internationalization level increases in all years, compared to the 2015 fiscal year.

Concerning hypothesis 4, to determine if there is a significant statistical relationship between allocated incentives (funds received in each year) and the financial value creation, employment, and internationalization level, the statistical technique used is Pearson Correlation Coefficient.

Analysis and Discussion of Research Results

After sample analysis, consisting of 228 companies, it can be observed that several supported projects by Qualification and Internationalization Incentive System have not been adequately implemented over the years studied. Furthermore, it was observed the existence of some outliers in terms of economic and financial data. Thus, the final sample integrated only 213 companies.

Under hypothesis 1, it is intended to verify whether 2016, 2017, 2018, and 2019 EVA has exceeded 2015 within companies that obtained Community incentives under the Qualification and Internationalization Incentive System.

In this sense, it was performed a sample-related means differences parametric test (t student) and a non-parametric test (Wilcoxon). In 2016, 2017, 2018, and 2019 the studied companies presented an EVA with an average value of EUR 119.325, EUR 166.524, EUR 154.270, and EUR 234.668, respectively, while in 2015, the same indicator achieved EUR 92.365 (Table 1). Although, on average, 2016, 2017, 2018, and 2019 EVA's have much higher values than in 2015, the difference found is statistically significant only in 2017 and 2019, in t-student test, and 2016 and 2017 in Wilcoxon test. So, only 2018 does not present significant differences in the value of EVA.

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Thus, in statistical terms, we can suggest that companies that obtained Community incentives under Qualification and Internationalization Incentive System had a significant increase in their capacity to create economic value.

Table 1. Statistics from EVA

Tests	Variable	Average 2015 (euros)	Average 2016 (euros)	Average 2017 (euros)	Average 2018 (euros)	Average 2019 (euros)
--	EVA	92 365	119 325	166 524	154 270	234 668
T-Student	(p-value)	--	0.467	0.06**	0.215	0.043*
Wilcoxon	(p-value)	--	0.058**	0.059**	0.348	0.187

* Significant to p-value <0,05; ** Significant to p-value <0,1

To observe with a broader detail EVA's evolution from 2015 to 2019, it also performed means differences tests for the remaining variables that condition its calculation: NIWFL, WACC, and investment level.

Table 2 presents the mean values in all years of studied variables and the significance level of performed means differences tests (t-tests pairs).

Table 2. Statistics from NIWFL, WACC and investment level

Tests	Variables	Average 2015 (euros)	Average 2016 (euros)	Average 2017 (euros)	Average 2018 (euros)	Average 2019 (euros)
--	NIWFL	493 184	557 945	554 929	567 786	657 903
T-Student	(p-value)	--	0.224	0.116	0.158	0.032**
Wilcoxon	(p-value)	--	0.099***	0.250	0.604	0.322
--	WACC	3.50%	3.36%	3.12%	3.08%	2.95%
T-Student	(p-value)	--	0.354	0.023**	0.001*	0.014**
Wilcoxon	(p-value)	--	0.000*	0.000*	0.002*	0.007*
--	Investment	10 264 487	10 839 570	11 553 099	12 078 484	12 778 845
T-Student	(p-value)	--	0.001*	0.000*	0.000*	0.000*
Wilcoxon	(p-value)	--	0.000*	0.000*	0.000*	0.000*

* Significant to p-value <0,01; ** Significant to p-value <0,05; *** Significant to p-value <0,1

As we can see, in t-tests pairs, the level of significance is relevant in the following situations:

- NIWFL: there are some significant differences in 2019 (t student test) and in 2016 (Wilcoxon test). However, the value of NIWFL was higher in all years compared to the 2015 value (it passed from 493.184€ in 2015 to 657.903€ in 2019);
- WACC: only in 2016 are the differences not relevant, and it is possible to observe that the cost of capital has been decreasing progressively over the years. The statistics are significant in both tests (t student and Wilcoxon);

- Investment: all the years studied present relevant differences (in both tests). It is possible to observe that the value of the investment has increased progressively over the years, which can be directly associated with the execution of the projects financed under the Qualification and Internationalization Incentive System.

Previously we had verified that EVA achieved a positive evolution from 2015 to 2019. The analysis of the variables that constitute EVA revealed a negative evolution at the investment level, but in turn, an average increase of NIWFL and a decrease in the cost of capital used. So, the increment of NIWFL and the reduction in the cost of financing sources has contributed to mitigating the negative impact of investment and to an absolute increase in EVA indicator from 2015 to 2019.

About research hypotheses 2 and 3, which intend to verify employment increase and internationalization level of companies receiving incentives under the Qualification and Internationalization Incentive System in 2015, differences in means tests were also carried out between 2015 values and every other year.

We found that differences that occurred among years under analysis are statistically significant in all years, about employees' number increasing. In relation to the internationalization level impact, values decreased since 2015 (only in 2019 the value is higher than in 2015), and there are no relevant p-values in all years. This may be due to the fact that the Portuguese economy has grown at an accelerated pace in recent years, which may have led companies to respond to the domestic market and not have enough resources to, simultaneously, bet more on the internationalization of the business.

On what concerns employees' number, it is noted that companies that benefited from incentives allocated under Qualification and Internationalization Incentive System in 2015 created more jobs. However, they did not improve international markets' entrance capacity.

Table 3 highlights the number of employees' average values and internationalization level between 2015 and 2019.

Table 3. Average values and p-values of the number of employees and the level of internationalization

Tests	Indicators	Average 2015	Average 2016	Average 2017	Average 2018	Average 2019
--	Number of employees	87	91	97	101	101
T-Student	(p-value)	--	0.000*	0.000*	0.000*	0.000*
Wilcoxon	(p-value)	--	0.000*	0.000*	0.000*	0.000*
--	Level of internationalization	35.32%	34.39%	34.29%	34.79%	35.79%
T-Student	(p-value)	--	0.239	0.214	0.608	0.675
Wilcoxon	(p-value)	--	0.86	0.36	0.858	0.296

* Significant to p-value <0,01

Finally, to validate investigation hypothesis number 4, a correlation Pearson coefficient test was performed between each year's received grants value and EVA, employees' number, and internationalization level, from 2014 to 2018.

According to Pearson's correlation coefficients presented in table 4, the connection between the received subsidies value and the studied variables is only significant in EVA (2016 and 2017) and in the

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number of employees (all years). Surprisingly these funds, specifically oriented to finance strategies in foreign markets, do not present any relation with the level of internationalization.

Table 4. Pearson's correlation coefficients and p-values between grants received and EVA, number of employees and internationalization level

Variables	2016	2017	2018	2019
EVA	0.124 (0.036)**	0.109 (0.057)***	0.057 (0.205)	0.004 (0.476)
Number of employees	0.297 (0.000)*	0.273 (0.000)*	0.286 (0.000)*	0.313 (0.000)*
Level of internationalization	0.063 (0.182)	0.042 (0.275)	0.066 (0.171)	0.053 (0.221)

* Significant to p-value <0,01; ** Significant to p-value <0,05; *** Significant to p-value <0,1

In conclusion, and generically speaking, companies that have obtained incentives under Qualification and Internationalization Incentive System improved their capacity to create value and create jobs from 2015 to 2019. However, they did not increase their capacity to work in foreign markets.

Also, it is possible to observe that the companies with financing in the Qualification and Internationalization Incentive System increased their NIWFL and decreased their WACC, which can be related to a lower business risk perceived by banks.

Another important conclusion is that, unmistakably, EU funds contribute to increasing employment. So, they can have a considerable role in struggling against the pandemic situation's negative impact on the Portuguese economy recovery in the next couple of years.

CONCLUSION

This research aimed to highlight the importance of internationalization in the business context and its relationship with innovation and financial performance.

Also, this research had the objective to study the impact of Community EU funds on the capacity value creation, on the capacity for internationalization, and on job creation, of the Portuguese companies to understand if they can have an important role in stressing pandemic situation negative impact.

So, the theoretical framework was developed, focusing on several important topics about internationalization, financial performance assessment concepts, value creation logic, metrics to value creation, and capital cost.

The developed study analyzed a final sample of 213 companies that benefited from EU funds in 2015 under the Qualification and Internationalization Incentive System. To measure value creation capacity, the chosen indicator was EVA, since it allows to easily measure created value in each period and can directly be obtained from companies' financial statements.

The research results show that studied companies presented a greater value creation and employment capacity. On the other side, the capacity of internationalizing has not increased in the studied years, which is quite surprising because the Qualification and Internationalization Incentive System is specifically oriented to finance expenses in internationalization or in the qualification of the companies to contribute to their success in the foreign markets.

So, in relation to hypothesis 4, the statistical tests performed show a direct relationship between companies' best performance in EVA and job creation indicators and the funds received, but the relation with internationalization was not verified.

However, the statistics showed clearly, that companies receiving EU funds significantly increased their number of employees in the studied time period, which can suggest that EU funds might have a substantial immediate role in fighting against the negative impact of the pandemic situation.

In addition, it was observed that the greatest contribution to the positive evaluation of value creation was capital cost, which decreased from 2015 to 2019. Also, the NIWFL grew during the period analyzed and had a favorable impact on value creation. On the other side, it is possible to observe that the increase of the investment attenuated the positive impact of the capital cost and of the NIWFL.

Regarding the investigation's limitations, of notice is the fact that there still little research on this subject; thus, it was difficult to take a more comprehensive view of the conclusions on the impact of EU funds on companies' performance.

Future research may be enriched by analyzing more companies in different periods in order to have a more overall picture of EU funds' importance in creating Portuguese companies' financial value.

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Chapter 10

The Effect of Early Age Involvement to Individuals' Financial Literacy and Financial Well-Being: Impact of COVID-19 on Economic Well-Being

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ABSTRACT

Financial literacy is an essential skill, and it is even more critical during economic crises. The COVID-19 pandemic affected the global and domestic economies. While some of its aspects are beyond individual control, financial knowledge can help mitigate the economic crisis, manage income, and help people manage their respective finances. In the past decade, Malaysia experienced a volatile financial environment domestically, but the reverberations were also felt regionally and globally. Variations such as inflation, currency and interest rates fluctuation, and increased living costs affected a significant change, not only to the Malaysian economic landscape but also to individuals. These shortcomings were exacerbated during the COVID-19 pandemic due to its resulting cash-flow problems, where some companies reported “zero income” and reversed the economic growth to -6% in 2020. Youth unemployment tripled (11.7%). Cash-flow imbalances occurred due to payroll, business loans, utilities, and other fixed costs that business owners were obligated to meet.

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INTRODUCTION

The COVID-19 pandemic was a severe test on individual financial resilience and a challenge for small businesses. Businesses' temporary closure had a strong negative impact on their well-being (OECD, 2020), which is felt in many countries, some more substantial than others. The impact was more severe in countries that reported vulnerabilities in their financial management. Australia is a good example, as it is among the top 10 financially literate countries within the OECD. Statistics show that before the COVID-19 economic crisis, they faced domestic vulnerabilities concerning financial literacy, customer credit and mortgage borrowing, household debt, and household income (Preston, 2020). During the COVID-19 economic crisis, the most vulnerable group in Australia were the youth, women, and those with primary education and low financial literacy, lacking an understanding of basic financial concepts such as inflation, compound interest, and risk diversification. To mitigate economic vulnerabilities during COVID-19, Australia banned predatory payday lending, which requires alternative arrangements such as extra funding via the No Interest Loan Schemes. However, improving the community's financial literacy as a whole could be a long-term plan that government organizations should carry out to protect those who are less financially literate (Preston, 2020).

A similar condition is evident in the U.S. For many years, the lack of financial understanding is one reason many Americans have problems saving and investing. Many consumers have minimal understanding of how credit works and its potential impacts on their financial well-being. During the COVID-19 economic crisis, workers felt the financial squeeze, translating into a long-term personal financial crisis. A survey conducted among 1,000 Americans shows that 25% have no one to turn to for financial advice, which shows the importance of financial education, particularly during the COVID-19 economic crisis. This is supported by a study conducted by OECD (2020), which reported that the pressure of the COVID-19 crisis put a severe strain on individuals' financial resilience. Part of the OECD COVID-19 recovery package doubled the efforts to promote financial literacy, focusing on women and young migrants (Jenkins, 2020).

A report from the Malaysian Insolvency Department shows that 25.2% of bankruptcy cases from 2017-2019 consist of young people aged 35 and below. Evidence shows that during the COVID-19 pandemic, household debt reached 87.5% of the gross domestic product (GDP). Most Malaysians did not fare well in managing finances. One of the reasons could be the education system. In Malaysia, education from Primary One through Secondary Six focus on academic achievement in various subjects, but personal financial management is left to adults. With the upcoming Vision 2020, Malaysia is also heading towards an aged nation by 2030. A few years ago, in 2015, the Deputy Finance Minister highlighted his concern that financial literacy in Malaysia is low, with only 20 - 25% of Malaysian knowing financial planning and retirement (Halim, 2014), while the recent COVID-19 pandemic and economic crisis in the country shows that financial literacy remains low. It seems sensible that low financial literacy in Malaysia is perceived as the key that will weaken the participation and reasonable action by society, leading to a negative outcome that would affect the path towards achieving personal financial goals, Vision 2020, and the aged nation 2030. The Malaysian deputy finance minister announced that it is the government's responsibility to increase financial literacy among the community and empower people with financial knowledge and skills (Shahar, 2020). The government initiated various financial education programs, including webinars, talks, quizzes, competitions, discussions, and exhibitions online to educate the community to make sound financial decisions (Shahar, 2020).

The IndiaLends survey among 5,000 Indians shows that 82% of Indians were victims of the financial squeeze caused by COVID-19, with 94% indicating that they would have spent money with extra care in the next few months. 84% cut back on spending, and 90% are concerned about their savings and financial future. The condition is worse for Indians with lower incomes and the lack of financial inclusion and awareness because they lack resources (saving and investment). Financial literacy and inclusiveness can help reduce the pandemic's devastating impact on the earnings and savings while creating awareness in the COVID-19 circumstances (Chakraborty, 2020).

The above evidence confirms that low financial literacy limited people's ability to assess and make effective financial decisions (Chinen & Endo, 2012). Adequate financial literacy will prevent someone from harmful financial acts and problems [Muñoz-Murillo et al., 2020]. This is especially poignant during the COVID-19 economic crisis, where the resource is limited. Income is limited during the COVID-19 pandemic, but the lack of income can be mitigated if the community behaves in a financially responsible manner, such as increasing savings, as per Ameliawati and Setiyani (Ameliawati & Setiyani, 2018). Financial literacy will increase collective knowledge for balancing between income and expenditure and plan for the emergency funds in the future, which increases financial well-being. Effective financial management and attitude influence financial decisions (Yuesti et al., 2020; Setiyani & Solichatun, 2019). Financial literacy can play a preventive role via positive financial behaviors in the event of another pandemic (Yuesti et al., 2020).

Reflecting on the COVID-19 pandemic economic crisis, questions arise about what role financial literacy and financial socialization agent will play in preparing people to face economic challenges, how financial attitude and self-efficacy impact confidence for managing money during the crisis, and how financial literacy can lead to recovery. This chapter aims to discuss the role of financial socialization agents, such as parents, peers, and school, and the influence of financial activities on positive financial outcomes. The data is collected from the researcher's associates, acquaintances, and family members and analyzed via quantitative methods. The results are presented in the following sections. First, financial literacy, financial socialization, financial behaviors, and financial wellbeing are discussed.

FINANCIAL LITERACY

Financial, be it personal or corporate, requires ability ranging from most superficial skills to the most complex. From a fundamental standpoint, the concept of financial literacy in previous research evolved from acquiring financial knowledge and skills to applying it to various parts of financial management.

In the book "Rich Dad, Poor Dad" by Robert Kiyosaki, the author narrated the financial literacy exposure of the characters, which commenced from when they were seven. Learning financial-related matters was raised as the characters aged further into young individuals, making them successful individuals as adults. The book indirectly narrated financial knowledge via various agents such as peers, parents, school, and external parties. Huston (2010) stressed that financial knowledge is an integral component of financial literacy but unidentical. He stressed that many researchers use financial literacy and financial knowledge interchangeably in his article, although the exact definitions may differ (Huston, 2010).

Previous researches studied the link between financial knowledge and broader financial management skills and behaviors such as cash flow management, savings, and investing (Hogarth & Hilgert, 2003). It was noted that there is a significant correlation between the level of financial knowledge and sound financial management practices. Individuals familiar with financial concepts and products were

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more likely to balance their checkbooks every month, budget for savings, and have investment accounts (Hogarth & Hilgert, 2003). Kim (2001) argued that financial literacy is the basic knowledge required for survival in modern society. This was supported by (Greenspan, 2001), who perceives that financial skills and literacy are essential to individuals and communities' long-term well-being.

Mandell's (2008) research among high school student leavers confirmed that students leave schools without the sufficient ability and skills to make critical decisions that could affect their entire lives. Subsequently, when they enter college, young adults must start developing financial literacy due to the transition from financial dependence to independence (Arnett, 2011). The majority of young adults could have depended on their parents for financial support and decisions throughout their lives, but during college, many are beginning to make financial decisions independently for the first time. Becoming financially capable in college will benefit young adults tremendously as they transition from college and become financially responsible for themselves and their families in the future. Bolaños (Bolanos, 2012) explains that financial literacy comprises two main components: knowledge, skills, ability, and the financial attitude factor, encompassing attitude, belief, and self-efficacy. Previous research showed that students or even young people lack financial literacy, and there is a need to improve the level of financial knowledge amongst the non-adults (Sabri et al., 2010).

FINANCIAL SOCIALIZATION

The introduction and shaping of financial literacy must start somewhere. The process by which a group of people, particularly young people, acquire skills, knowledge, and attitude relevant to their practical function as consumers in the marketplace is defined as financial socialization by Ward (Ward, 1974). Previous research pointed out that literacy is obtained from various sources, such as parent and family, formal education, and peers. Involvement with financial socialization agents such as parents, peers, and the school results in the development of financial knowledge, skills, and attitudes (Bolanos, 2012).

The relationship of involvement at an early age is associated with early childhood experience. Sabri & Falahati (2012) explains that childhood experience via the primary (mother, father, siblings, and religion) and secondary financial socialization agents (peers, media, and internet) influence financial literacy, financial management, and financial well-being. Ward (1974) introduces the theory of Consumer Socialization, which was also supported by Moschis (1987). This theory agrees that individuals, particularly children, and adolescents, develop consumer skills, knowledge, and attitudes by interacting with various socialization agents such as parents, peers, and school. Previous research emphasized that parents, peers, printed media, television commercials, and in-school education are the most critical consumer socialization agents (Chan & McNeal, 2002). Consumer socialization research suggests that much of the consumer behavior among adults is learned during pre-adult years via socialization agents' influence (Mandell & Klein, 2009).

Bolanos (2012) agreed that financial literacy and enhancing financial behaviors are amongst the utmost life skills that need to be developed during early teens. Grounding relevant and appropriate financial knowledge, skills, and behavior at the right age provide readiness to assume financial responsibility upon reaching adulthood (Bolanos, 2012). Most research concluded that financial socialization agents should intervene at an individuals' early age [Sabri et al., 2010]. Positive early childhood financial and consumer experiences improve the college students' financial literacy and consequently, significantly affect students' financial management (Sabri, 2011).

Parents

The family was labeled as the primary agent where children start experiencing money management skills at an early age and continue through adolescence. This is well supported in Bowen (2002), Koonce, Mimura, Mauldin, and Rupured & Jordan (2008). Based on (Pinto et al., 2005), parents play a crucial role in shaping a child's financial habits and values. Other research showed that involvement with essential aspects of family finance, for instance, e.g., discussing family finances with parents during childhood, improved knowledge and experience about money management among Malaysian college students (Sabri et al., 2010). Another study by Kotlikoff and Bernheim (2001) found that individuals who had an allowance, bank account, or investment when they were children saved more of their income as adults. In addition to educating, parents are also seen as the most significant influence on children as they learn consumer financial behavior (Hayta, 2008).

Lyons et al. (2006) stressed that most college students indicated that they consulted their parents for financial information. He also reported that the more parents talked about finance with their children, the more knowledgeable the children were about personal finance as college students [Shim et al., 2009]. The same article demonstrated that discussing finances with parents in childhood consumer experience's timing positively influences financial literacy.

School

Young children at schools need to "read and write" financially (Lusardi, 2008). The researcher commented that while the goal of current education is preparing students for employment, it should also prepare them for financial management to adequately manage their income or earnings from employment (Danes & Haberman, 2007). Previous research pointed out that educational institutions play vital roles in nurturing and educating children about financial knowledge. Schools are noted to play a critical role in providing personal finance education (Mandell, 2008, CEE, 2009). Other researchers agree that education within a high school can better prepare youth to encounter a complex marketplace that puts young adults at risk for future financial instability (Danes & Haberman, 2007).

The research was conducted on a middle school in New England, implementing a Financial Literacy Education Program since 2005 on its 8th Grade students (Bolanos, 2012). The study concluded that the school programs significantly increased financial knowledge, enhanced the financial attitude significantly, and improved financial behavior to a moderate effect size (Bolanos, 2012). Peng, Bartholomae, Fox, and Cravener (2007) examined the impact of personal financial education in high school and college on students' investment knowledge and savings rate. They found that if respondents held a bank account before age 18, they were more likely to have higher investment knowledge. Davidson (2006) acknowledged that financial literacy training needs to start from high schools and be taught in comprehensive manners in colleges and universities. Toussaint-Comeau and Rhine (2000) suggested that children should be taught saving habits and should be inculcated with a saving culture at an early age.

In line with Malaysia's Vision 2020, Bank Negara Malaysia was known to have collaborated with the Education Ministry to incorporate financial education in the formal curriculum for schools. The areas proposed to be covered financial management and planning, savings and investments, credit and debt management, and protection and insurance. These plans were supposedly implemented with primary schools in 2014 and secondary school by 2017 (Star, 2013). For some unknown reasons, primary schools have yet to see the said syllabus.

Peer

As individuals experience daily lives, peer groups and friendships affect social behaviors. The influence of peer groups and friendships during childhood has long been known to be important in both emotional and cognitive developments [Pressley & McCormick, 2007]. Studies have also shown that peer groups influence and contribute to effective learning about monetary values and social motivation (Hayta, 2008). Hayta (2008) acknowledged that children from their pre-school and later continuing into their latest school years spend more time in school with teachers and friends than their parents.

Financial Behaviors

Financial literacy has been proven to be linked to individual financial behaviors. Many researchers concluded that insufficient knowledge of personal finance among respondents, especially college students, is associated with ineffective financial behaviors (Sabri et al., 2010; Norvilitis & Santa Maria, 2002). Other research pointed out that financial literacy and financial behaviors are individual elements that construct an individual's financial capability. Financial capability refers to people's ability to manage and take control of their finances (Taylor, 2011). Garman and Fogue [2006] indicated that expected financial behavior includes practices relating to cash, credit, and savings management, for which an effective behavior refers to positive or desirable behavior recommended by consumer economists to improve financial well-being.

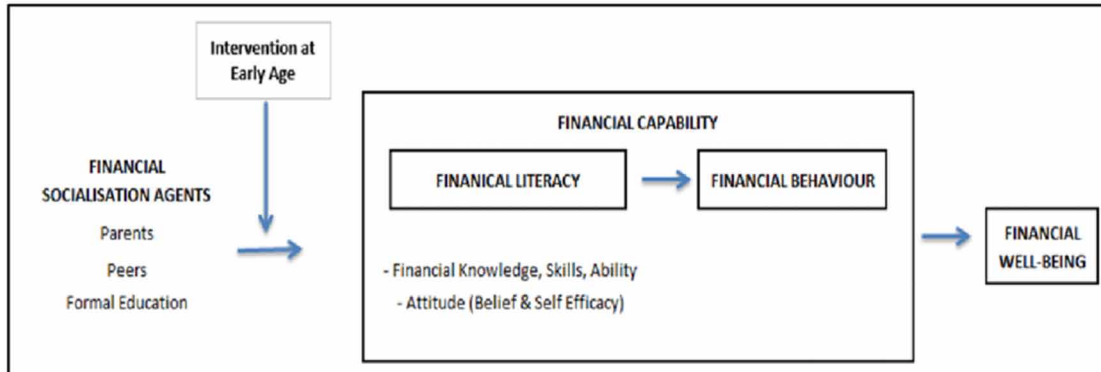
Based on the research done by Pillai et al. (2010), respondents felt that being financially literate is beneficial in navigating them on adopting the best investment approach, maintain healthy spending habits, save them from a crisis or help them buy the right kind of insurance. Citing Malaysian research on undergraduate students in Kedah, it was confirmed that the respondents lack sufficient financial knowledge, which led to weak money management behavior (Dahlia, 2009). If students can manage their finances, there will be fewer defaults on student loan debts (Cummins et al., 2009). Also, students with high financial literacy will have fewer chances of suffering bankruptcy, receive government assistance (Huston et al., 2003], and making poor consumer decisions (Hayhoe, 2000].

Financial Well Being

The ultimate measure of success for financial literacy efforts should be individual financial well-being. Financial wellness encompasses financial well-being and is something more than income (Mahendru, 2020). Financial well-being is "the state of being whereby a person is fully able to meet his current commitments, can feel secure in the financial future, and can make the choice that makes him enjoy life" (Mahendru, 2020, page 1). It should be pointed out that financial literacy does influence one's financial well-being. Joo (2008) mentioned that it is justified that financial well-being would be improved with positive financial behavior. However, failure to manage personal finances can have severe long-term and adverse social and societal consequences (Perry & Morris, 2005).

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Figure 1. Impact of financial literacy on financial well-being



DATA COLLECTION

The questionnaire was developed based on the previous research and pre-tested questionnaire with university students to establish its face validity. Reliability analysis was performed. A total of 500 questionnaires were distributed across the researcher's associates, acquaintances, and family members. They then distributed it to their family, friends, colleagues, and neighborhoods. 442 questionnaires were returned, with 373 completed. Most of the 373 respondents are female (N= 225, 60.3%), while the remainder male (N=148, 39.7%). The majority of the respondents who had participated are 25 - 34 years old, representing 126 respondents (33.8%), followed by the second group between 35 - 44 years (33.8%) of the total respondents. Most of the respondents are married (60.1%), while 37.5% are not. Out of the ones married, 233, ~46.9% have children.

DATA ANALYSIS AND RESULTS

This research focus on three financial socialization agents; parents, peer, and formal education. Respondents were asked to measure the above agents' level of influence below 18 years old. The scale was from one to five, "Not Influential" to "Strongly Influential. Based on the results, parents, as financial socialization agents, have the highest mean than other agents, 3.60. This shows that respondents opine that parents were the primary influence for their related financial matters below 18 years (Table 1). Agents, school, and peers were somehow rated lower and seemed quite closely scored, which carries the mean 2.73 and 2.69, respectively.

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Table 1. Source of Financial Socialization

	Parents	School	Peers
Valid	373	373	373
Missing	0	0	0
N Mean	3.60	2.73	2.69

The role of parents on children's financial literacy was measured through eight questions such as discussing banking concepts, budgeting, saving, and spending money (Table 2). The highest mean score was on set aside money regularly for the future (3.50).

Table 2. Detailed Parent's Influence (before age of 18 years old)

	Parents: Discuss banking concepts	Parents: Discuss budgeting	Parents: Teach how to save	Parents: Teach how to invest	Parents: Speak about how mone should be spent	Parents: Set aside money regularly for the future	Parents: Spend within the budget	Parents: Manage their expenses and avoid overspending
Valid	373	373	373	373	373	373	373	373
Missing	0	0	0	0	0	0	0	0
N Mean	2.46	2.75	3.45	2.36	3.46	3.50	3.43	3.47

About 42.9% of respondents either did not or hardly observed the peers' money management when they were below 18 years old. About 23.6% claimed that they highly observed the way peers manage money and spending. The majority of a group of 33.5% do observe the peers occasionally. We note that the majority of respondents observed their peers spent just right. It is then followed by 108 respondents who observed their peers spent too much.

For the item on school, most respondents (n=271) were not taught on financial related formally at school. About 102 responded "yes" could have included the related school syllabus such as "e-commerce, accounting, or mathematics" as part of this question which is usually taught in the school syllabus. Respondents were asked if they attended any after-school programs at the age of below 18 years old. The majority of respondents (232) did not attend, as opposed to 141 respondents who attended similar financial-related programs out of school. These programs could have been the extra-curricular activities initiated by parents or organizations during school holidays.

The involvement and interaction activities in schools involving financial activities such as buying at the restaurant, buying books, purchase at the school shop, transportation, and mathematics.

Saving Behavior

79 respondents (21.2%) started saving at >18 years. 242 individuals (64.9%) started saving before they were 18. Within the group of "< 18 years old", the majority (29%) declared that they started saving from the age of 7 – 12 years old. The majority of the respondents, 60.1%, were involved in financial

activities under 18 years old. One hundred twenty-six respondents (33.8%) stated that they first opened accounts at the age of above 18 years old. A minority of the respondents fall under the group of “Never” and “Do not remember” of 9 (2.4%) and 14 (3.8%) respondents, respectively. A slightly bigger group of respondents (33%) opened accounts when they are past 18 years old relative to the same group that started saving when they are above 18 years old, 21.2%.

Financial Literacy

Financial literacy encompasses two dimensions; (a) knowledge, skills, and ability, and (b) financial attitude factor, adapted from Bolaños (18). For financial knowledge, skills, and ability, the respondents were measured via two approaches; i) objective measure using financial quiz (calculation of saving account interest; interest and inflation rate; mortgage and interest rate; Investment and stock), and ii) subjective measures, which are developed for respondents' self-assessments. For the objective measure, the higher scores indicate more excellent financial knowledge. Objective scores were then grouped into two categories, i.e., “Pass” and “Fail,” based on the total scores on correct answers.

The objective test results show that ~7% of the respondents scored “0” with no correct answers, and 27.6% of respondents managed to provide the correct answers for all questions. The results show that the “Pass” group is higher than the “Failed” Group, at 52% and 48%, respectively. To the question about calculating saving account interest, most of the respondents (78.8%) answered correctly, while the remainder gave false answers, and 6.2% claimed that they did not know the answer. As for questions related to interest and inflation rate, most of the respondents (64.9%) managed to answer it correctly, while the remaining 22.2% provided the wrong answer. The percentage of “Do not Know” is even higher, at 21.2%, for the question on mortgage and interest rate. Those answering correctly are close to 60%, while the false answer of 19.3% seems higher for this segment than the other questions. The answer to the question on investment and stock is reported to have a higher percentage of “Do not Know” responses, i.e., 43.2%. About the same percentage of 161 respondents (43.2%) provided the correct answer, while 13.7% gave the wrong answer.

To assess the respondent's subjective literacy assessment, respondents presented a series of Likert scale questions to gauge their understanding of financial topics. Amongst the questions, the lowest level of understanding was for the topic on “investment,” with a mean of 2.77, followed by “Retirement Funds,” with a mean of 3.07.

Financial Attitudinal Factors are Measured in Two Dimensions as Well, i.e., i) Beliefs and Attitudes and ii) Self-Efficacy

1. Belief composite of financial attitudes towards money management skills, saving regularly, spending within the budget, tracking expenses, and saving/investing for a long-term goal. Five items were developed under this construct measured on a five-point Likert scale from “Extremely Not Important” to “Very Important” to determine the importance of such financial-related beliefs and attitudes.
2. Financial self-efficacy scales indicators are for the respondent to self-rate themselves on their confidence in personal money management; aware that it affects their future; making financial decisions; their careful use of money; and confidence in achieving financial goals.

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Based on the results, both components were somehow highly scored by respondents with a mean of > 4.2 belief and attitude and mean > 3 for financial confidence. Respondents highly regard the importance of instilling the respective attitude and have high confidence in their current financial management.

Financial Behavior

Financial behaviors in this study will focus on four aspects including spending wisely, using a budget, tracking of cash flows, and saving regularly. Range of questions developed (using a Likert scale) to measure how they spend their money. Respondents are seen to portray a relatively good desired behavior with higher scores of mean above moderate (above 3.0). The respondents were presented with four questions related to behavior. For questions related to spending against income, most customer respondents spend either less or just about their income. This reflects a reasonable and desired behavior. The majority, at 46.1%, responded that they have figured out the amount required for retirement. This again reflects a positive desired behavior, but it is important to note that a close percentage of 36.5% responded otherwise. On the desired financial behavior on credit card payment, an almost equal percentage of respondents, 29.8%, make full payment, while 30% of respondents do not make payment in full. The majority of respondents do not seek professional investment advice. Generally, the analysis showed that the influence of financial socialization agents at an early age positively influences the financial behavior and financial well-being.

DISCUSSION

Financial literacy and financial behavior are said to influence the financial decision-making process and journey towards financial well-being. The results show that the level of financial literacy for adults in Malaysia is relatively low. Consequently, this is expected to impact day-to-day financial management and behavior and influence individuals' financial well-being in the long run. This also suggests that the young groups below 18 years old are not taught academically about Malaysia's financial management matters. It has come out recently that financial management amongst individuals in Malaysia requires attention due to high debt status and other similar issues such as unpreparedness for retirement, for instance. It is questionable that Malaysians are financially literate and possess the right kind of financial behavior to be led to the current worrying state of financial management. The current economic condition and individual financial well-being proved that the area of financial literacy requires special attention. The COVID-19 pandemic put economic and financial pressures on individuals (Preston, 2020). This highlighted the need for timely and appropriate advice and counseling services for those affected (Preston, 2020).

The results of the descriptive test show that the majority of respondents, at > 70%, were influenced by parents, peer, and school (FSA) at the age of below 18 years old, ranging from the degree of less influential to highly influential as compared to the group that was rated FSA as not influential at below 18 years old. At an early age, the influence of FSA correlated very well and firmly with positive subsequent financial behavior and financial well-being, suggesting that to improve the subsequent financial outcome, socialization agents' influence has to be initiated early.

Results show that parents are the most influential FSA when below 18 years old. As per the literature, parents have always been the primary source of financial socialization agent (FSA). Since children and young individuals are family-based and family ties are generally closer in Asian cultures, this influence cannot be denied. Individuals were either taught by parents or have directly or indirectly observed par-

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ents demonstrating financial information or behaviors. With this influence, parents' influence positively and on medium strength will affect financial literacy, financial behavior, and financial well-being. This suggested that parents need to engage their children early to influence their literacy level and behavior and gain better outcomes on financial being.

Peers and School were noted to be the lower-rated agents, but peers were rated slightly higher than the influence of School. The main reason would be that any individuals at the young age groups below 18 years would be associated with peers in some way or another, such as in schools and neighborhoods. It was concluded that respondents whom peers influenced did observe how their peers managed their spending (N= 281 /373). Out of this, most of the respondents (N=185) observed that their peers spent just about right or little. The influence at an early age affected the outcomes.

The school's influence was low, and most respondents did not undertake any extracurricular activity on related financial education out of school hours at the age of below 18 years old (N=192/271). In Malaysian schools, financial-related subjects such as accounting are not core subjects for students. If the school segregation is based on academic achievement and streams (Arts and Science streams), accounting courses would not be offered or even selected by the students. Courses on finance in colleges and universities are skewed more towards corporate finance and financial management for business purposes than personal financial management. Consequently, the exposure to personal finance management amongst these young groups is minimal except for what they learned through experience, family, or even peers. The improvisation in the outcome of financial literacy, behavior, and wellbeing could be highly contributed by other factors such as the courses taken after 18 years old, attending financial management talks and seminars, or financial event influence. This is supported by the evidence that occupation of being in the financial sector correlates positively with financial outcomes. The results supporting the previous study highlighted that due to lack of sufficient financial knowledge (Lusardi et al., 2010), many college students perceived a higher level of financial problems (Sabri et al., 2020).

We have observed that involvement in financial activities when below 18 years old affects subsequent financial behavior. This suggests that should individuals be involved in any financial activities at this particular age; they would be better off. In the earlier descriptive analyses, we noted that some financial behaviors such as payment of cards and setting aside unknown amounts for retirements were rated poorly. Hence, getting involved in financial activities early would provide better literacy and numeracy, and understand of financial terms. It would make some sense of direction on how much to be saved or what amount should be in a bank account. This may create awareness over time and on the scale of savings amount. Hence, proper planning is expected to be conducted by an individual.

Consequently, better behavior is expected because individuals would be more effective in managing their finances and leading to positive financial management. It was noted that the more significant number of activities involved, the better the financial well-being. Early exposure in numerous activities would accumulate the experience while inculcating a positive financial behavior, leading to greater financial well-being.

The topic of investment throughout the research was rated poorly. Parents' influence on investment matters was rated the lowest (Mean: 2.36/5.00). The majority of respondents claimed that their understanding of investment matters is relatively low (Mean: 2.77/5.00). Almost 50% of respondents claimed that they do not seek professional investment advice, which could be attributed to many factors; not knowing the reliable source to consult and fees associated with such advisory. From the descriptive analysis, the financial wellbeing indicators show around three for all indicators. Without investment and only with savings, the accumulation of wealth would progress slowly. Without proper guidance on

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investment, mistakes in investment planning could be significant. This could be a potential area that could be improved for the financial well-being of an individual.

~70% of the respondents disagree and moderately agree with the statement that teenagers and young adults in their surroundings understand money management basics and are adequately prepared to manage their own. This section has the lowest mean of 2.80, reflecting that money management needs to be improved. ~60% of respondents believe that the age of 7 -12 would be the right time to expose or start teaching money management basics to children.

Finally, the results of this study support the need to formulate financial management skills at schools. With the extensive hours and effort spent on education, the formal education system should bear the task of teaching the nation (formally) financial-related matters in schools. This would create an educated and informed nation, which would benefit the growth of each individual, household, and country. The effort by New Zealand, Australia, and some other countries who have recently introduced or planning to have those syllabuses in school is commendable and should be taken as an example.

Financial regulators, implementers, and financial institutions should work with the educator to create programs to encourage more financial involvements at the age of below 18. A best tailored financial product such as savings accounts and savings habits should be promoted together during this engagement to encourage early involvement. If those programs are implemented in schools, parents' involvement is expected to be significant due to their engagement with their school committee.

Regarding the COVID-19 recovery plan, policymakers in some countries provided temporary unemployment benefits and easier access to individual finance as subsidized costs and provide 'credit holidays' by requiring banks to defer the payment dates of loan installments in total. Providing accessible advice and counseling services on financial literacy, which boosts an individual's ability to handle financial stress, was on the agenda to increase individual trust and confidence (OECD, 2020). Malaysian policymakers implemented some training and advice on financial decision-making for individuals and businesses; however, this training should prepare the country for future crises.

CONCLUSION

The role of financial socialization at early age and involvement in financial activities at an early age provides a good platform for improving financial outcomes such as financial literacy, financial behavior, and financial well-being. This research suggests that early exposure is worth exploring to improve related financial outcomes. The need to instill awareness on personal financial management may start way before tertiary education to create positive cash management attitudes. Acquiring financial knowledge and building literacy is not an overnight activity. A reasonable financial literacy development level requires time, pace, tools, and scenarios to test and improve these skills. The absence of early exposure may not create a solid foundation and allow reasonable time to practice proper personal financial management.

It is undeniable that the financial outcome could be contributed by many other internal and external factors such as salary scale, retrenchment, economic factors. The point here is that with early exposure, an individual gains knowledge earlier, which paves the way to managing outcomes by instilling a good, desired behavior. Early exposure allows the accumulation of knowledge and experience over the period while one is young. A financial mistake could be costly and detrimental if committed at a later stage due to exposure to financial-related matters at a later stage or never. By having a weak foundation, individuals

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cannot make informed financial decisions that will contribute significantly to the debt and bankruptcy level in the country and, consequently, affect retirement planning.

Main financial socialization agents such as parents and schools should intervene at an early age due to their proven positive correlation with the financial outcome. Hensley (2020) indicated that financial education alone is not enough to foresee economic challenges and remedy a crisis. This shows that while the education system is one of the pillars, there are other factors such as peers, parents, financial attitude, age, financial resources, among others, which impact individual financial well-being and ability to manage the crisis; even though during the COVID-19 crisis some people blamed the ineffectiveness of the financial education. Excellent financial literacy is acquired from the public and formal education in the family surrounding environment. Parents have an essential role in educating children to manage finances early and show some examples of appropriate financial decision-making (Yuesti et al., 2020).

This study also suggests that one should be involved in financial-related activities to boost the subsequent financial outcome, which is financial literacy, financial behavior, and financial wellbeing. The COVID-19 pandemic and economic crisis presented a unique teachable moment. They highlighted the need to increase individual financial literacy and to learn the basic concept of budgeting, the benefits of compound interest, consistent savings behavior, and medium and long-term planning. Economic crisis during COVID-19 creates a potential trigger to motivate individuals to invest in their human capital, increase financial literacy, and change behavior that might negatively affect their financial resilience and well-being (OECD, 2020).

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Chapter 11

Cushioning the Economy From COVID-19: A Commentary on the Approaches Adopted by Major Nations

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ABSTRACT

The COVID-19 pandemic has left the world in complete disarray. Different economies around the world have tackled the COVID-19 pandemic differently, with several monetary and fiscal policies being introduced to combat the devastating effects the pandemic has had on the economy. This chapter focuses on some of the most economically powerful countries and their policies to overcome pandemic-related adversities. More importantly, it gives insights on how COVID-19 is different from earlier crises in terms of its characteristics and also in terms of the uniqueness of the initiatives taken by the major economies in mitigating its impact. The chapter also discusses how the new-age technologies can help manage this crisis better. The study also discusses the implications for the policymakers, the governments, the executioners, and the think tanks or consultants to the decision makers.

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INTRODUCTION

Economic recessions are an indispensable part of the global business cycles because all the countries get impacted by them (Osinska et al., 2016). But each crisis is different from the earlier ones. Covid-19 started as a biological crisis but transformed into a sociological and economic object of discussion (Ozili, 2020). The earlier financial crisis of 2000 and 2008 have happened due to financial shocks (Jermann and Quadrini, 2012) as compared to the Covid-19 crisis. The IMF (International Monetary Fund) officials have quoted that the economic slowdown caused by the pandemic was the worst since “The Great Depression” in the 1930s.

The crisis of Covid-19 has been very unique as well as very severe and dangerous (Borio, 2020; Sukharev, 2020). This pandemic was an unparalleled shock at the global scale and has caused immense disruption in the interlinked global economy. The supply of goods and services were impacted by the reduced productivity and availability of labor caused by the infections, as well as by the lockdowns, organizational shut-downs, and social distancing norms. The demand has taken a hit with the reduction in incomes and loss of jobs, leading to a reduction in private spending and freezing of investment decisions by the businesses, which worsens the situation further. There was a social as well as economic chaos of the magnitude that has no precedence in history. The virus is causing tragic loss of life, and the lockdown needed to fight it has affected billions of people. As an implication of the complete lockdown, social and economic activities have come to a halt. It is time that the world economies revive and resume their activities to put the development of the country back on track. Almost every government around the world has projected their economy to contract in 2020, despite billions of dollars being pumped into the system by Central governments and Central banks. The impact that Covid-19 has had on different countries has been different, owing to the dynamic nature of the world economy. However, Covid-19 had a significant effect on the economy of all the nations (Sahoo and Ashwani, 2020).

All the nations irrespective of whether they are classified as developed or developing, have suffered and are still at risk. The situation is particularly worrisome in the developing nations with inadequate medical services, and in the highly populated slum areas where social distancing is very difficult to achieve. They are more vulnerable to economic disruptions in demand and supply and have limited financial resources but more debt obligations. International trade has also taken a hit, which impacts the nations that are commodity exporters.

The coronavirus (Covid-19) pandemic affected the GDP of all the global economies. It made all the businesses around the globe go stand still for a moment. But with solidarity and help from each other, all the countries are trying to get back on track to cope up with this pandemic. It has so adversely affected our country’s economy that it would take a few years to revive and get back those growth numbers. Therefore it’s really important to have full-fledged research on the GDP to predict its trend shortly. It not only helps industries to plan their strategies but also the government to adopt strategies which will help its citizens and in house business houses to strive.

The paper has been structured into eight sections. Section one gives a brief introduction to the topic of discussion. Section 2 discusses how Covid-19 Crisis is different from the earlier crises. Section 3 discusses the control tools in the hands of the government. Section 4 gives a small overview of the need for government intervention by forecasting the Indian GDP growth rates in the absence of the same. Section 5 discusses in detail the approach adopted by the major economies across the World. Section 6 explores the possible directions for the use of new-age technologies in handling the crisis better. Section 7 elaborates the implications of this study for the policy-makers, while Section 8 concludes the paper.

HOW COVID-19 IS DIFFERENT FROM EARLIER RECESSIONS?

There are three dimensions based on which the economic recessions can be described to convey their scale. These are the nature of the recession, policy response to the recession, and structural disruption caused by the recession. Let us see how the Covid-19 crisis is unparalleled in each of these three dimensions. First, the nature of this recession is that of a pandemic caused by health hazards, as against the earlier crises which were driven by financial chaos in the equity markets or the housing markets. Second, the policy response in the Covid-19 crisis was very different from the earlier crisis. In the earlier crisis, the policy response was more towards stimulating the demand, but in the Covid-19 crisis, it is more about keeping the public-health safe. It is being recognized that economic wellbeing is secondary to physical and mental wellbeing. Third, the structural disruption caused by the recession was enormous in terms of the way it has given a push to digitalization, online services, and contactless transactions.

Taking into account all the above three dimensions, it can be safely said that Covid-19 was one of the most severe recessions as of now (Linan & Jaen, 2020). Although it is very unlikely that the world's major economies will quickly come out of the recession, the pace of recovery can be expedited with the administration of the Covid-19 vaccine and with government intervention through policy initiatives.

CONTROL TOOLS IN THE HANDS OF THE GOVERNMENTS

This section is divided into four sub-sections. Fiscal policy discusses the fiscal measures in the hands of the government that can help in a recessionary cycle. Monetary policy discusses the monetary measures that the government can take. Effective Planning and Execution of policies elaborates on the need for effective timing of and coordination between the policies. The role of technology and predictive modeling in managing the crisis better discusses how technology can be leveraged for economic policy-making as per the existing literature.

Fiscal Policy

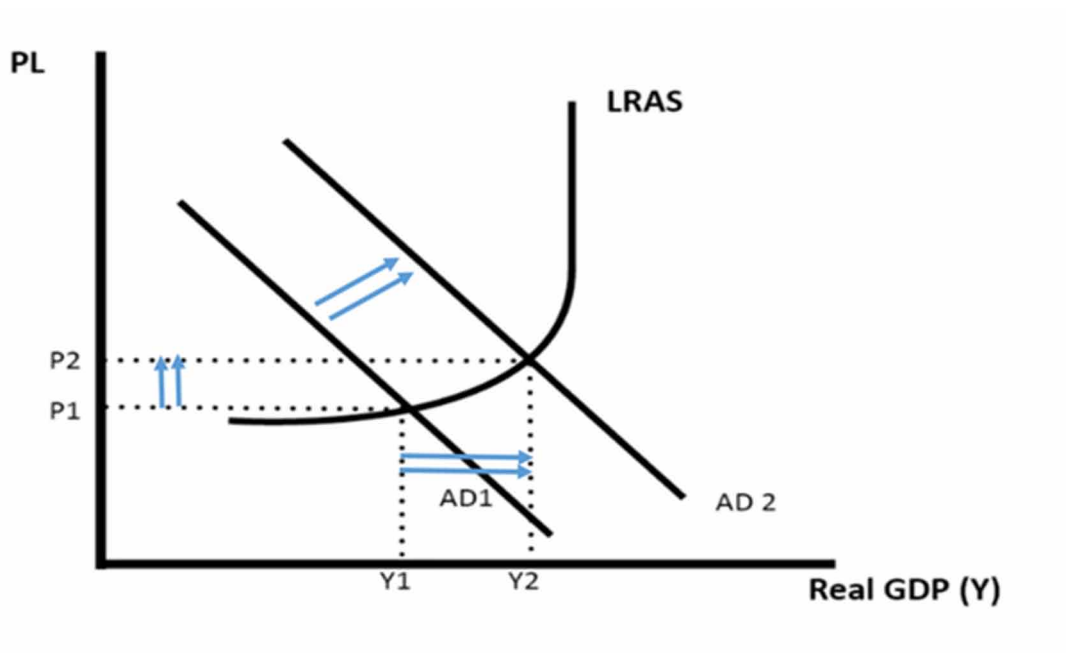
The private sector spending is a significant driver of GDP and is severely impacted in recessionary times. In such cases, the government does more spending or cuts down the taxes to give a boost to aggregate demand. And the government does the reverse of this when the private sector spends too much so that it can control inflation. Thus, fiscal policies play a crucial role in maintaining economic stability, which is why there exist fiscal deficits in downtimes and fiscal surpluses in good times.

The importance of fiscal policy in mitigating the recessionary effects cannot be undermined. Fiscal expansion can be done not only through cutting taxes but also by creating new employment opportunities in the form of projects. The more wages and the reduced unemployment, in turn, create higher demand and spreads the optimism in the industry, creating a virtuous cycle. Offering financial support to SMEs is also a proven way of effectively improving the economic situation and increasing employment (Seo, 2017).

The fiscal policy can be used to increase aggregate demand and run the economy out of recession (Nevile et al., 2015). This concept is illustrated in Figure 1. But it takes time for the government to change its spending plans and once implemented, it will take time for this spending plan to increase AD (Aggregate Demand). By this time maybe the economy has already recovered and thus the changes in

spending could have negative effects. Second, increasing AD may cause crowding out (Mohanty, 2019). This means that the increase in government spending may lead to a fall in private sector spending. But this viewpoint is rejected by Keynesians on the pretext that the government will be utilizing the previously un-utilized or sub-optimally resources only and therefore, crowding out may not be observed.

Figure 1. Effect of fiscal expansion on Aggregate Demand and Real GDP
Source: Made by the authors



Eggertsson (2011) proposed the fiscal policy framework in case of stagflation when the interest rates near zero. Government spending also results in an increase in consumption, and therefore, an increase in the GDP growth rate (Gali et al., 2007). There is a piece of evidence that government spending multipliers are not influenced by the economic cycles, i.e., they are not significantly different in the good times and the bad times (Ramey and Zubairy, 2018). Leeper et al. (2017) quantified government spending multipliers in US data using Bayesian analysis of the monetary model.

It is also important that the exact composition of the government spending at times of recession be perfectly determined to optimize the utilization of the limited resources available to the governments (Bouakez et al., 2020). If the fiscal stimulus is given without an increase in government debt, it leads to a full and speedy recovery from the severe recession (Seidman and Lewis, 2015). The fiscal multiplier is generally large in the case of passive monetary policies, and also increases with the duration of the stimulus (Kiley, 2016). If the government purchases increase, that leads to an increase in private consumption and output but leads to a depreciation in the real exchange rate (Ravn et al., 2012).

Monetary Policy

Monetary policy is related to the measures taken by the central banks of the nations to condition the supply of money and promote the stable growth of the economy. The changes to the money supply and interest rates are meant to control not only inflation but also consumption and liquidity. The interest rate changes, sales, and purchases of government bonds, changes to the reserves requirements of the banks, controlling the currency exchange rates, etc, are a few of the monetary measures that are adopted by the governments. The monetary measures taken by the regulatory banks leads to a reduction in the credit spreads (Curdia & Woodford, 2010) and creates a positive investment atmosphere in the economy, making it easier for businesses to invest (Guo & He, 2020).

Gertler and Kiyotaki (2010), and Gertler and Karadi (2011) developed an unconventional monetary policy where the banks can give risky loans as an endogenous choice in bad times in exchange for equity and can cover up for that risk in the good times. Credit easing policies lead to the faster recovery of the economy, and the expansionary fiscal measures create a multiplier effect that helps in a speedy recovery from the liquidity trap (Yopez, 2018).

Expansionary monetary policy is resorted to by the central banks when they need to stimulate the demand in the economy. The lesser borrowing costs caused by the reduced interest rates encourage people to spend more. The promising entrepreneurs or the enthusiastic industrialists should not feel that access to credit is a deterrent to them from their own business, which can be achieved through lower interest rates. It is helpful in fighting recession and increasing Aggregate demand. However it has several disadvantages in some scenarios.

When the bad times are mild, the demand for capital investment by the businesses is still adequate to make them respond to the lower interest rates, and therefore aggregate demand can be boosted and the economy can be brought to full employment level of output, causing an increase in aggregate demand. But when the bad times are deeply recessionary, the businesses will not respond to lower interest rates because of the fear of future deflation, or because they perceive the future demand to be lesser. An example of this can be observed in the 2008/09 recession when the interest rates were cut to 0.5% by the European Commercial Bank, but the financial institutions were not eager to lend. Therefore, monetary policy becomes almost ineffective in times of a liquidity trap.

Effective Planning and Execution of policies

Trenovski and Tashevka (2019) proposed a framework for key macroeconomic policies in times of global recession. If the fiscal initiatives and the monetary initiatives taken by the government are not aligned with each other, that can have serious implications for economic growth (Jayaraman et al. 2016; Bianchi & Melosi, 2019). Monetary Policies play a no lesser role in resolving the liquidity crunches and taking the economies out of stagnation (Buera & Nicolini, 2020). Since the different fiscal and monetary measures have a trade-off with each other, the frictions between the stabilization policies can often be observed in action (de Blas & Malmierca, 2020). Woodford (2011) said that the multiplier for government spending can be lower than one if the government chooses to increase the interest rates in response to the increase in inflation with the expansionary policy.

Allsop and Vines (2015) compared the economic policies in the times of moderation with those at the times of recession. There is a lesson to learn from the Great Depression when the monetary and fiscal policies were wrongly designed and have an impact on psychology and uncertainty (Tanzi, 2015).

Budgetary control performs well in case of bad times only if the fiscal policies are relaxed and monetary policies are accommodated (Teglio et al., 2019).

It is important to note that not only the nature of economic decisions but also the timing of the same that needs to be sound (Alesina et al. 2018). The policy intervention by the government and the regulators has its time lag effects also (Klimchuk et al., 2019). Christiano et al. (2005) said that there is an inertia in the macroeconomic variables in the case of shocks.

The Role of Technology and Predictive Modeling in Managing the Crisis Better

Technology can play a crucial role in predicting the future effects of the policy decisions, or in monitoring the real-time impact of the policies in the form of trade, employment, demand, production output, etc. There has been a recent amount of research done on how technology can help in making better predictions. Even the capital markets are an important means of channelizing funds to business ideas, and they behave differently in each crisis. Bianchi (2020) studied how the financial markets behaved differently at the time of the great recession and the great depression. Therefore, technology can help in business policy decision making if the capital markets can be predicted better. Table 1 lists a few of the papers on the use of predictive modeling for econometric research.

Table 1. The earlier research papers on forecasting of economic variables using algorithms

Work	Forecasting
Martínez-Martín & Rusticelli (2021)	Global trade
Lee & Kim (2020), Li & Tang (2020); Manahov & Zhang (2019); Sharma et al. (2016)	Stock markets
Mavragani et al. (2020), Nag & Mitra (2002); Wilcoxson et al. (2020)	Exchange rates
Funke & Tsang (2020)	Banks' Response
Hutter (2020)	Employment
Galvao & Lopresto (2020); Jonsson (2020); Lam & Oshodi (2016); Chuku et al. (2019); Ge & Tang (2020)	GDP growth rates and Production Output
Zhao (2020)	Turning points of business cycles
Katris (2021); Malkov (2020)	Covid-19 diffusion
Xie et al. (2021)	Demand Forecasting

THE APPROACH ADOPTED BY THE MAJOR NATIONS

This section is going to dwell upon the nature of policy interventions adopted by the major nations across the World.

The Approach Adopted by the USA

Being the most powerful economy in the world, the US reported its first covid-19 case in January 2020. There was no complete lockdown imposed in the country but there were preventive measures taken to

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contain the spread. The preventive measures varied by the state with some states closing public gatherings like educational institutions, clubs, restaurants, and theatres. Coming to the fiscal policies taken by the government, the PayCheck Protection Program and Health Care Enhancement Act of US\$483 billion, including US\$383 billion for administration loans of small businesses to provide grants and loans so they can retain workers (Shambaugh, 2020). US\$100 billion were used for strengthening healthcare services in hospitals and for developing facilities for virus testing. Around US\$2.3 trillion were used as Coronavirus Aid, Relief and Economic Security Act (CARES Act) to provide a one-time tax rebate to individuals, to provide unemployment benefits, and to prevent corporate bankruptcy by providing loans.

Talking about Monetary Policies by the US Fed, depository institutions were encouraged by Federal banking supervisors to use their buffers to lend to borrowers affected by covid-19 and also to work constructively with them. They also announced that debt modifications related to covid-19 would not be considered as stressed loan restructurings (Patton, 2020). Holdings of U.S. Treasury Securities and deposits in the Federal Reserve Banks were temporarily excluded while calculating the supplementary leverage ratio for holding companies. All these measures have ensured to keep the unemployment rate in check at 6.9%. The US economy bounced back strongly by a rate of 33.1% in Q3 of 2020 (IMF, 2020).

The Approach Adopted by India

One of the most populated countries and with a fast-growing economy, India reported its first covid-19 case in late January 2020. The country imposed an entire lockdown on March 24 with some areas extending partial lockdown up to November 30. Due to the unprecedented lockdown, the economy had taken a hit with a GDP contraction of 23.9% in Q2 of 2020 (IMF, 2020). The government had to take measures to revive and rebuild the economy. In the early stages of the revival, most measures affected primarily social protection and healthcare. This included making the food and cooking gas more accessible by cash transfers to the financially weaker households. Other expenses included insuring the lives of healthcare workers and developing infrastructure for healthcare across the country. An incentive scheme to revive the production was introduced across 13 priority sectors, which is about to cost approximately 0.8 percent of GDP over the next 5 years. A fertilizer subsidy was allotted for benefiting the agriculture sector and, the urban housing construction was given support (Zee Media Bureau, 2020). Several measures were also announced to facilitate the tax compliance, that include postponement of tax-filing and other deadlines related to compliance. The penalty interest rate for overdue GST filings was also reduced.

Now, let us have a look at the monetary measures taken up by the Indian Government. A lending program with a 100 percent guarantee and without requiring collateral was announced. A partial guaranteed subordinated debt was allotted for stressed SMEs. A partial credit guarantee scheme for public sector banks was given on borrowings of non-banking financial companies, housing finance companies (HFCs), and microfinance institutions (MFIs) (Zee Media Bureau, 2020). To purchase the short-term debt of the eligible non-bank financial companies and housing finance companies a special purpose vehicle (SPV) was announced by the government.

The Approach Adopted by China

China was the first major economy in the world to recover from the effects of the Covid-19 pandemic, reporting an unexpected 3.2% growth in the quarter ending June, and a 4.9% growth in the latest quarter (ending September), compared to their 6.8% contraction in the quarter ending March- their worst

performance in over 50 years (The Economic Times News, 2020). Strict lockdown imposed by the Communist Party to control the virus, and economic stimulus provided by the government have worked out well there. Chinese banks pumped in more than USD 1 trillion in the first quarter of 2020 (The World Bank, 2020). The People's Bank of China (PBOC) was looking for targeted rate cuts and liquidity injections to stabilize the situation via open-market operations like medium-term lending and reverse repo transactions apart from providing easier lending options to SMEs. New bank loans worth USD 1 trillion were given out in the first quarter of 2020 as a result of the money being pumped in. There was a reduction of 30 basis points in the 7-day and 14-day reverse repo rates (IMF, 2020). The economy seems to be on the recovery path driven by a 9.9% increase in exports in the quarter ending September, and a rebound in production. An increase in local travel also seems to have had a positive impact on the economy (BBC News, 2019).

The Approach Adopted by Europe

While China seems to have recovered well from the effects of the pandemic, countries in Europe are still facing the wrath of the pandemic. It was hardly a year since the Eurozone had recovered from the malaise (Jarociński & Maćkowiak, 2018), that it was destined to be bogged down again by the Covid-19 recession.

Lockdowns were lifted in July, as infection rates were coming down. However, the second wave of Coronavirus infections has led to major European economies downgrading already dismal growth forecasts. Many countries are already imposing lockdowns and night curfews again in major cities and hotspots (The World Bank, 2020). Bank of Spain has already warned of a 10.5% to 12.6% contraction in GDP in 2020 (CNBC, 2020). The Italian government saw GDP contracting by 10.5% in 2020 and expanding by a meager 1.8% in 2021 in the worst-case scenario (Bloomberg, 2020). Countries like Italy, Spain, and France— which depend heavily on tourism, were hit hard by the pandemic. With international travel at a standstill, the economies have suffered a lot. Major domestic restrictions and internal and intra-Europe travel restrictions were lifted in June, but with new infections on the rise, international travel not seeming to resume any time soon, and debt increasing, the path ahead does not seem too bright for the countries in the European Union. European Union provided for the flexibility in the use of structural adaptation funds so that they could be used to fight the pandemic. EU also freed the unused funds reserved for rural development to fund covid-19 initiatives. They also eased the reporting and audit measures during Covid-19 so that funds could be re-allocated to the most deserving sections of the society at the earliest. The union also issued ESM (European Stability Mechanism) loans to support countries only for the Covid-19 costs. It also offered EIB guarantees to mobilise up to 200 Billion euros in loans mainly for private sector and SMEs.

The Approach Adopted by Japan

One of the nearest countries to China, where covid-19 is said to have originated, Japan reported its first case in late January 2020. To curb the spread, Japan imposed an entry ban on goods and people from 152 countries. A state emergency for seven prefectures was declared by Prime Minister Shinzo Abe on April 7 and an emergency in all prefectures by April 16. On May 4th, The nationwide emergency was extended to May 31. The economy had taken a hit due to restrictions in trade. The 2020 Tokyo Olympic Games were postponed to 2021. Fiscal policies were also introduced to revive the economy. The Emergency Economic Package was adopted against covid-19 by the Government on April 7 worth ¥117.1

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trillion. The package had a multi-dimensional perspective in developing preventive measures to curb the spread of infection, in providing employment and to protect businesses, in nurturing economic activities after the end of containment, in rebuilding a resilient economic structure. in enhancing preparedness for the future and, in strengthening the treatment capacity (Government Responses on the Coronavirus Disease 2019). The key initiatives included distributing cash to every citizen and subsequently affected firms, postponement of tax payments, and loan concessions from public and private financial institutions. Japan also gave US\$100 million contributions to the IMF's Catastrophe Containment and Relief Trust in April for helping the financially weakest and most vulnerable countries in fighting covid-19. In October, Japan announced an additional contribution of US\$10 million to the covid-19 Crisis Development Initiative (Nohara, 2020). The government also expanded the volume of concessional loan facilities primarily for micro, small and medium-sized businesses affected by covid-19 with help from the Japan Finance Corporation.

The Approach Adopted by France

France, Europe's second-largest economy has warned of a plateaued growth in the final quarter of 2020, because of restricted business activity. France saw a 5.9% contraction in quarter 1, and a 13.8% contraction in quarter 2 of 2020 (The World Bank, 2020). The French government has provided health insurance support to the sick and their caregivers, ensured liquidity through the postponement of tax payments and social security, and postponement of rent and utilities for micro-enterprises and SMEs among other measures. Until May 18'2020, there was also a temporary ban on short-selling stocks as stock markets around the world came crashing down (IMF, 2020). The government has also launched a new fiscal package on 3rd September, which included policy measures amounting to roughly 100 billion euros spanning over the next 24 months.

The Approach Adopted by Germany

Bundesbank, Germany's central bank has said it expected a shrink in economic output by around 7% in the year 2020-21. The German government had adopted 2 supplementary budgets, one in March (of the size of 4.9% of the GDP), and one in June (4% of the GDP). The government also provided 50 billion euros in grants, and interest-free tax deferrals to self-employed individuals and small businesses severely troubled by the Covid-19 pandemic. There was also a stimulus package in June which comprised of income support to families, VAT reduction (temporary), and financial support for local governments (IMF, 2020).

The Approach Adopted by the UAE

UAE is another major economy that is projected to contract in the fiscal year 2020-21 amid the Covid-19 pandemic. Oil production cuts, lower oil prices, reduced demand for oil in the global market, and disruption in supply chains around the world have contributed negatively to UAE's economy in the financial year. UAE's economy was already weakening even before the pandemic. There was a contraction of 0.3% on the overall GDP in quarter 1 of 2020, and a further contraction of 6.3% is projected (CBPP, 2020). The authorities in UAE have announced fiscal measures of AED 32 billion (2.8% of GDP) so far. This includes AED 16 billion to support the private sector by reducing government fees and other

charges, and AED 1.5 billion to provide additional subsidies for utilities like water and electricity, and AED 9 billion for the 'Ghadan-21' stimulus program (IFM, 2020). The policy interest rate was reduced by 125 basis points by the Central Bank of UAE. They also announced a package amounting to 20% of their GDP (AED 256 billion) to provide easier loans to SMEs and maintain liquidity. An additional stimulus package (worth AED 500 million) was announced in October-end by Dubai to support the local economy (IFM, 2020).

UNCONVENTIONAL APPROACHES ADOPTED IN TIMES OF COVID-19

Since Covid-19 crisis is not triggered by financial practices but by a pandemic, the measures adopted by the countries had to be non-conventional ones. Although they can be broadly classified as monetary or fiscal easing, but the nature of policy initiatives has been quite different as compared to the ones adopted in the earlier crises. This section has referred to the reports available on the website of IMF (International Monetary Fund).

First, the direct income support to the households by the federal government of India is a first-of-its kind fiscal expansionary measure. Also, an income support to the Indian farmers is also being given by the government of India. INR 1.7 lakh crore of direct benefit package for 800 million people was announced by the government of India. Similarly, the wages under MNREGA act were increased by more than 10% for the 136 million beneficiary families. Public Distribution System was also used to provide wheat, rice, food grains and LPG cylinder refills. Similar direct income support measures have also been adopted by many other nations such as USA which came up with the concept of de-coupled payments that are lumpsum transfers from government to the households, and do not impact the production decisions in contrast to the the conventional coupled payments that were linked to production decisions. Turkey has given 1,000 Turkish liras (\$150) cash support to 2.1 million low-income households, and decided to reach to another 2.3 million households to support nearly 4.5 million low-income families in total. The country also raised the amount of funds provided to the social assistance and solidarity foundations to 180 million Turkish liras (nearly \$26 million). In addition Turkey decided to transfer over 352.8 million Turkish liras (\$50.8 million) additional resources to these foundations. The other countries that used direct cash transfer to protect their people are Brazil, Bolivia, Cambodia, Chile, Cote d'Ivoire, Ecuador, Egypt, Gambia, Georgia, Guatemala, Guinea, Honduras, Indonesia, Iran, Iraq, Jamaica, Jordan, Kazakhstan, Kenya, Malaysia, Mozambique, Myanmar, Nigeria, Pakistan, Peru, Serbia, Vietnam and Zimbabwe (International Monetary Fund, 2020).

Although it is debated that such direct cash transfers are only a temporary measure and that structural reforms are the key to sustained economic performance, the direct income transfer results in a faster recovery in the short run, and provides much needed short-term liquidity in the system. Another benefit of such direct income transfer is that the level of support can be adjusted in accordance to the changing economic environment. Direct income transfer also helps in reduction of corruption and patronage politics, thereby, improving the quality of democracy. On the other hand, the in-kind subsidies like the ones given under PDS are observed to reduce the level of choice for the beneficiaries.

Secondly, the global central banks also purchased the bonds to boost their respective economies. Some of them are US Fed, Bank of Japan and Bank of England. ECB (European Commercial Bank) launched the new corona bond buying program worth 750 Billion euros. Such purchase of bonds is expected to boost the growth by stabilizing markets and driving faster inflation. There is also an increasing tendency

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of the governments to buy short-term debt and sovereign bonds were issued in many countries such as UK, Canada and Australia to finance the pandemic rescue packages. Another important aspect related to the recent purchase of bonds is that it was funded by extensive printing of the currency. For example: US printed currency worth 3 trillion dollars during the second quarter of the year 2020. A part of this easy money created by banks percolated to the stock markets globally as well (International Monetary Fund, 2020).

Thirdly, Indian Central Bank (RBI) announced an extension of the time period for resolution timeline of large accounts under default by 90 days. The Indian government provided lot of incentives for the business owners. The government announced measures targeting businesses: (i) a collateral-free lending program with 100 percent guarantee, (ii) subordinate debt for stressed MSMEs with partial guarantee, and (iii) partial credit guarantee scheme for public sector banks on borrowings of nonbank financial companies, housing finance companies (HFCs), and micro finance institutions. The launch of production linked incentive scheme by Indian government was another encouragement to keep the manufacturing industry supplying the goods to the economy in the tougher times. In order to attract the foreign capital into the country, Indian government increased the limit for foreign portfolio investment in corporate bonds to 15% of the outstanding stock for the fiscal year 2020-21; as well as removed the restriction for the non-resident investment in the securities issued by the central government. Other countries that did the same were Spain, Ethiopia and Algeria.

Fourthly, the central banks in many countries had to intervene the falling exchange rates also. A few such examples are Brazil, Fiji, Kyrgyz Republic, etc. IMF categorised the steps taken by the countries into two broad categories: above the line measures (focused on expenditure and accelerated spending) and below the line measures (focused on providing liquidity through equity injections, loans, asset purchases, credit guarantees and quasi-fiscal operations).

Fifth, an important characteristic of the Covid-19 pandemic is the extraordinary level of generosity displayed by the countries while doing expenditure on healthcare; which included the capacity enhancement for manufacturing of medicines and medical supplies, research and development on the virus and vaccine development, capacity expansion of healthcare infrastructure, free supplies of personal protective equipment, etc.

Sixth, The Indian central bank indulged in simultaneous purchase and sale of government securities to manage the yields. Such a phenomenon is generally called “Operation Twist” as the term was coined by the Fed in 1961. Asset purchase programs were also launched by the governments in several countries such as Chile, Netherlands, Greece, Jamaica, and European Union. Privatisation was used in Iran to generate funds that can be used for financing the growth.

Finally, some of the other non-conventional measures adopted by the nations included the utility subsidism, tax deferrals, equity injection, etc. Utility subsidies were given in many countries such as Argentina, Armenia, Brazil, Australia, Colombia, El Salvador, France, Georgia, Guinea, Italy, Mongolia, Nepal, Pakistan, Senegal, Solomon Islands, Ukraine and Uruguay. Equity injection into state run companies was done in many nations such as Germany, Solomon Islands, Morocco and Turkey. Tax deferrals were also provided by many countries such as Albania, the Bahamas, Botswana, Canada, Chile, Germany, Italy, Mali, Malta, Portugal, Russia, Slovenia, Sweden and Turkey. With the exception of Brazil, Switzerland, and Israel, all of the countries with highest confirmed cases made it easier for the private sector to postpone the payment of their taxes. Severely affected companies were provided with funding, credits, and financing. In addition to Turkey, some other countries to provide credit support to

companies were Spain, France, Germany, China, Iran, Russia, the Netherlands, Switzerland, and India. Tuition assistance to the university and school students was provided in Georgia.

Thus, it would be clear that the government can create a lot of optimism in the downtime atmosphere by giving more money in the hands of the people. In the case of zero interest rates, monetary policies cannot provide a suitable stimulus. Tax policy can deliver this stimulus at no cost and consistently (Correia et al. 2013). Although the eurozone was designed in a way that it had no role for fiscal policy, but the financial crisis of 2008 compelled the governments to intervene so that the financial system does not collapse (Zezza, 2020).

There has been evidence that public investment in bad times also is an effective policy (Petrovic et al., 2020). Also, the government spending multiplier is significantly greater than one in such a case (Christiano et al., 2011; Dosi et al., 2015; Di Serio et al., 2021; Miyamoto et al., 2016). Fiscal multipliers are counter-cyclical by nature and take higher values in recessionary times and lower values in times of expansion (Canzoneri et al., 2016).

LEVERAGING TECHNOLOGY TO PREDICT THE RESPONSE OF ALTERNATIVES

Artificial intelligence can be of immense help to the governments and policymakers in making data-driven decisions (Loukis et al., 2020; Chatterjee, 2020). The predictive analytics and machine learning techniques can give them a picture of the needs of a country, and help them predict the effectiveness of possible alternative solutions (Mouna et al., 2020). The conventional policy-making approaches have been based on instinct, personal experience, gut feel, and judgments. But now, with the computing power of the systems and availability of data, the distortions in the data can be done away with, and sound policies can be made. This would, in turn, increase the responsiveness of the government towards the citizens and make the democratic system better.

With innovations in technology, researchers are using Machine Learning and Artificial Intelligence models to predict the response to policy initiatives being considered. Although there are several challenges to this approach as these technologies are still in the developing phase. Random forest regression was found to be outperforming other forecasting methods by two researchers from the University College of London in 2016. Perhaps more importantly, this technique has predictive power over recessions as far as 3 quarters into the future - where the mean of SPF estimates has never predicted negative growth.

After the financial crisis of 2007-08, China reportedly used Real-Time Nowcasting to predict GDP and thus predict the after-effects of the financial crisis. This model predicted China's GDP with a confidence interval of 90% for the year 2009-2010. It's success has not been appreciable ever since. Today Real-Time Nowcasting faces several new as well as old challenges. The first challenge is connecting the information reflected in monthly data to the quarterly GDP. Baffigi et al. (2004) examined the concept of bridge equations or small models to address this challenge. However, the nowcasting using these bridge equations is judgmental and can deal with a few monthly data series. Then, handling a large number of monthly data series poses another challenge. It would be helpful in fighting recession if the same can be predicted with the help of Real-Time Nowcasting, and appropriate expansionary fiscal measures can be taken in due time so that the time lag inefficiency could be avoided. The use of factor models has become a standard practice now at banks and financial institutions (Boivin and Ng, 2005). However, it

becomes challenging when a large number of monthly data series are released at alternative times and with different lags, making the underlying datasets causing unbalanced at end of the sample.

There are a few things that the government can leverage AI capabilities better. It can reduce human intervention in those tasks that can be handed to machines, thereby saving labor and improving the efficiency of the labor time. This can, in turn, give much-needed bandwidth to the public servants and enable them to do more intellectual work, increasing their level of job satisfaction. They can also focus on doing more innovative work and less repetitive work. The government can also work with lesser staff and save the precious money of the tax-payer. Thus, AI has the power to radically transform business processes and organizations.

IMPLICATIONS OF THE STUDY

After summarizing the initiatives taken by major nations across the World, this section of the paper intends to put forward some generic steps which should be followed by almost every nation. Here are a few of the recommendations.

- **Take appropriate containment measures and provide adequate support for healthcare systems**

The matter of utmost importance in the pandemic is to defeat the virus and protect the health of the people. So, healthcare and medical spending take the greatest priority. It is important to increase the capacity of medical facilities and infrastructure. The limited resources need to be channeled more towards buying the medical testing kits, paying to the medicos, increasing the operating efficiency of hospitals, building makeshift clinics, etc. While exercising the constraint on business transactions, it needs to be taken care of that the supplies of medical and food needs are not disrupted.

- **Cushion impacted people and businesses with substantial, timely, and targeted fiscal and monetary measures**

The exact nature of the fiscal and monetary initiatives may be different for different countries and different stages of the pandemic. These measures may include tax deferments, unemployment insurances, cash transfers to the needy, easing of the credit terms, etc. Liquidity stress needs to be prevented from turning into solvency problems prevent liquidity pressures from developing into solvency issues and avoid economic scarring that would make it so much more difficult to recover.

- **Recovery from the containment phase**

As shown in section 4 (The approach adopted by the major nations), the possible scarring impact of the crisis must be mitigated by the policy action. Based on strong signs that the epidemic is retreating, this includes careful consideration of when to progressively relax restrictions. The demand has to be quickly promoted as steps to stabilize the economy take hold and business begins to normalize. It will be necessary to have a concerted fiscal stimulus. The nations with more resources and policy space need to be in a giving mode, while those with scarce resources can be the seekers of the support.

- **Encourage businesses, exports, and FDI**

Encouraging exports can turn a country from a consumer state to a producer state. Foreign Direct Investment (FDI) also needs to be encouraged. Once the pandemic is over, conducting international trade fairs to attract investors can also be done, in this way new employment can be generated, and a fresh flow of cash into the country can be achieved. The governments also need to make sure that the business environment is conducive to the businesses. The businesses flourish under favorable government policies and a peaceful atmosphere. In case the governments fail to ensure a peaceful atmosphere that is conducive to business activities, the businessmen pull their investments to shift to a country where they could make greater returns.

- **Use technology for effective planning and execution of policies**

Advancements in technology can also be used to take countries out of recession during tough times especially advancement in technology and rise in the field of Artificial intelligence and machine learning can be used effectively to tackle recession situation and AI can predict the outcomes of any plan the government is planning to implement and it can predict the impact of any new policies on the economy and help the government to tackle the recession times more effectively by providing insights of future.

- **Move from Econometrics to Machine Learning to predict the outcomes of policy proposals**

While the rigor of econometrics is undisputed, the predictive power of machine learning is also remarkable in ways more than one. First, the machine learning algorithms are found to be more suited than the traditional econometric models since they can work on unstructured data, which is the key characteristic of today's dynamic environment. Second, the basic econometric models provide one exact solution under a given set of assumptions, which may not hold good in real life; where as the machine learning models are trained by multiple iterations, and therefore, give the approximate solution that is close to the optimal one. Third, assumptions need to be made on the distribution of data in case of econometrics; while in case of machine learning, grid search algorithm or cross validation are used to optimize the meta parameters such as penalty, tree depth, etc. making it more suitable for non-parametric models. Thus, the econometric models are mathematically robust while the machine learning algoirhtms are empirically more effective.

CONCLUSION

The pandemic has led to a massive cash crunch and an exponential decrease in highly liquid markets leading to job losses and closure of businesses. Looking at this some governments are helping businesses with loan facilities for reopening their use cases without any collateral. Since the governments have become more powerful during the pandemic hence, the regulatory policies and govt. pumping money into the financial system can bring markets into activity.

It can be inferred from this study that all the major economies of the World have taken a multi-pronged approach for mitigating the effect of the pandemic on their economy. While some of the nations have relied more upon fiscal measures, others have relied more on monetary measures. It has been gener-

ally observed that in a recessionary crisis of the scale of Covid-19, the economists have always argued more for the fiscal measures as compared to the monetary measures. Although government spending is generally less efficient as compared to the spending by businesses, it results in faster improvement of the economy in a recessionary cycle. This is attributed to the fact that the monetary policies, which are aimed at encouraging the businesses to invest, will take more time to bring about an effect as compared to the fiscal policies where the investment schemes and jobs can be created by the governments immediately. But there is no single shoe that can fit all the feet sizes. Therefore, the exact optimal mix between the monetary and fiscal policies would vary from nation to nation, depending upon the components of their GDP, their inflationary cycles, the extent of the cyclicity of the businesses, the demographics, the contemporary needs of the industry, and the stage of the pandemic that they are witnessing. Each country may have a different recovery pace as compared to the other countries (Kolia & Papadopoulos, 2020). Also, it is very difficult to fine-tune the optimal mix of the two with the time, because of the problems such as time lags and information asymmetry.

The stimulus measures by the governments can expedite economic strengthening and can help spark growth. If the funds are kept directly in the people's hands, there can be a faster recovery post the pandemic. There is also a need for the policymakers to keep a vigil over the prospective economic disruptions. It is also important to determine the new optimal allocation of limited capital resources among the multiple available opportunities. If some reforms can be brought in to enable the countries to adjust the labor and capital fast, that can help. The disputes need to be resolved speedily, and regulatory roadblocks need to be reduced. The rationalization of subsidies can also incentivize the stakeholders to compete based on the merit of the ideas, and protectionism needs to be reduced. The nations need to become more resilient, and the transparency in financial commitments needs to be enhanced so that the confidence of the businesses is retained and the growth in investments can be facilitated.

AI and ML can support the government in minimizing corruption and maximizing the penetration rate of its offerings to the deserving beneficiaries. This can be done by tracing incomes and received aid, identifying the fraudulent activities in the much earlier stage of their life cycle, diagnosing undesirable events, enabling biometrics, identifying anomalous behavior, etc. It can also help in tracing the movements of people for traceability of epidemics and support actions. Development and articulation of statistical models to make better predictions and more accurate analysis can be another area where data science can help.

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Chapter 12

Critical Analysis of the World Economy and Deglobalization Processes in Times of Pandemic

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ABSTRACT

This chapter aims to critically analyze both the world economy and the deglobalization processes under the assumption that they are the result of a dialectical evolution of economic, financial, political, and sanitary crisis. This dialectical movement of the history of the globalization and deglobalization processes is always a very complex phenomena of interactions between the economic agents and political actors, leading to both progressive and regressive events of economic growth, social development, and environmental sustainability. After a period of intensive economic, trade, and financial integration in the creation of a world economy system, suddenly the economic, financial, and sanitary dysfunctions emerged at the interior and created a reactive deglobalization process. However, what has been at the center are the international cooperation and trade relations determined by the need to expand the possibilities of satisfying human needs, including culture.

INTRODUCTION

Under the concept of world economy or economic globalization (Sapir, 2016, 2011) the benefits and damages caused by the advances in the international economy are analyzed, questioning the achievements of reciprocity and equivalence between the advances in the development of national economies with diametrical differences. What results from international economic relations are very distant from the economic interrelationships of a globalized economic process.

The dialectical movement of history is complex with results that are both progressive and regressive. In world history, the processes of globalization that allow trade over great distances, have played

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a relevant role in the economic and social growth and development of the peoples involved. In each of these stages, globalization processes have presented different characteristics.

Globalization was conceived by Valéry (1945) as described by “Now the era of the finite world begins”, an expression that bears a lot of similarity with the descriptions of the global world of the XIX century (Andretta, 2002). The world was considered by McLuhan (1962) as a global village that is generally used to define the phenomenon of “globalization”. The term globalization has been used to describe the economic periods when the foreign direct investment (FDI) and trade flows decline for whatever the reason, such as the global economic crisis. Economic globalization is a process in which organizations, business and countries operate at world scale. Globalization is a process of economic, commercial, and financial interdependence between different countries.

Globalization is a phenomenon that Goldin and Reinsert (2007: 28) define as “an increase in the impact on human activities, due to forces that extend beyond national borders.”

The concept of mundialization (World economy) is more precise because it has a connotation related to geography while the concept of globalization is more generic that is related to an increasing interdependence between finance, production, the market and trade, free transit and commercial movements and international finance as a multidimensional socio-historical free trade process.

Globalization is defined by the WHO as the increased interconnectedness and interdependence between different peoples and countries. It includes the inter-related elements of the opening of international borders to flows of goods, services, finance, people, and ideas. Globalization also refers to the changes in national and international institutions and policies aimed to facilitate and promote such flows.

Globalization is a very complex phenomenon that has a considerable influence on contemporary societies. The economic dimensions of globalization have evolved concomitantly with dimensions that have independent dynamics of a nature other than economic determinism, such as social, environmental, etc. The components of globalization and international economic integration processes are creating new challenges to national governments due to such responsible causes as the national diversity of jurisdictions for trade liberalization policies, geographical factors, and institutional quality to enforce regulations. International trade is the exchange of goods and services across borders creating global markets.

As a phenomenon, globalization processes indirectly and subjectively affect the sensitivities of human and social activities that, when objectified as a process of improving people’s well-being and living conditions, imply concrete and contrasting measurements in terms of access to markets. In relation to economic globalization, the theories of economic growth and development related to the theories of international economic relations and international trade and the theory of social and personal well-being are closely linked to human development (Tugores, 2002: 233).

The economic development of globalization has been promoted by the most developed countries and multinational companies (Cepal, 2002: 17). However, the cooperation and trade relations at the international level are determined by the need to expand the possibilities of satisfying human needs, including culture.

This paper begins analyzing the dialectical evolution of the world economy to show that the current context is complex and uncertain due to the conflicts between the economic and political powers, sieges and commercial reprisals aggravated by the sanitary crisis which are leading the economic globalization processes in the opposite direction away from the international cooperation. From these points, the analyzes moves to consider the arguments in favor and against the economic globalization to understand the challenges faced by the continuing economic and financial global integration that put it at a crucial turning point. Finally, this analysis offers a discussion related to all the issues treated on this paper and

tries to identify some of the main points for a continuing debate on the future development of the world economy.

A DIALECTICAL EVOLUTION OF THE WORLD ECONOMY

Some authors contend that globalization begun about 60,000 year ago when the human history started as inherent phenomenon. Since then and through human history, civilizations have experienced migration, exploration expeditions, military conquests, exchanging trade and developed commercial routes.

The penultimate stage of globalization during the period 1820-1913 presented as relevant elements (Williamson, 2013) in commerce and poverty, when and how the backwardness of the Third World began, he relates that the industrial revolution produced an increase in the demand for raw materials for industrial production that provoke the opening of new international markets generate benefits in favor of the most industrialized countries. It was the colonial expression of the time favored by the emerging technologies of communication and transportation, but with less bellicosity than current globalization (Findlay and O'Rourke, 2007).

The collapse of the economic and financial integration processes during the Great Depression, in the 1930s there were tariff wars between countries with competitive devaluations that culminated in World War II (James, 2001). The Great Economic Depression of the 1930s brought down the economic and global integration that culminated in World War II. van Bergeijk (2010) assess overemphasizing the international trade in similar impact that the Great Depression had despite the different causes of the breakdowns, but he still demonstrates the globalization process was the result of the international trade flows, by the uncertainties of economic and social risks caused by the crisis.

Developing countries have the risks of unfavorable internal and external conditions that constraint the macroeconomic policies aimed to achieve equilibrium for economic globalization. However, this development was confined to very few countries while the nonmarket economies remained isolated and less developed economies choose the import substitution path of development.

International finance market has achieved globalization becoming the most relevant element serving the needs of international investment and trade activities and the most rapidly developing aspect of economic globalization since the 1970's. Far-reaching financial globalization changes in geographical organization and activities since the 1970s. In the 1970s, total trade flows exceeded the historical maximum GDP of the first wave in 1913.

Economic globalization, as we know it today, erupted in the eighties with the promotion of movements and mechanisms for the liberalization of international trade and finance, such as the elimination or reduction of barriers and tariffs, etc. Analyzes of data from economic globalization processes confirm that privatization and liberalization are intensifying with the new free trade agreements and the international financial system that is more globalized and immune to national regulations.

TENSIONS OF THE CURRENT GLOBALIZATION /DEGLOBALIZATION

The wave of globalization beginning in the 1980s was questioned by its stance and long-term incidence (Straw and Glennie, 2012). Economic globalization has not been exempted from complex contradictions of reality. Globalization was possible due to the collapse of the soviet system bringing delocalization,

deindustrialization, unemployment, precarious and debt leading to a financial crisis. The processes of economic globalization were driven at a time of power and unipolar euphoria with the announcement of “the end of history” made by Francis Fukuyama after the decline of the USSR, in the interest of postponing the dominance of North America.

FINANCIAL CRISIS AND IMPLICATIONS FOR GLOBALIZATION

Since the nineties, economic interdependence has intensified globalization among countries while causing a debate on the potential benefits in terms of economic growth to the involved countries. The last global trade liberalization agreement was the Uruguay Round, which ended in 1993, which created the World Trade Organization (WTO). During the Mexican financial crisis of 1995, the IMF (International Monetary Fund) limited the space of the Mexican government to impose the macroeconomic policies to facilitate the borrowing needed (Morady, Kapucu, and Yalçinkaya, (Ed.) 2017; CEPAL, 2002).

Private equity consolidated after the dot.com bubble burst in 2000/2001 and it continue increased until the outbreak of the financial crisis of 2008-2009. However, with the rapid rise of China and Russia, a multipolar or pluripolar world is given way, marking the decline of unipolar globalization. The long-term planning of China has taken advantage of globalization dealing with the challenges of supplying labor and reducing production costs at global scale. The construction of an alternative new globalization 2.0 relies more in infrastructure investments based on trade and financial ties.

During the economic and financial crisis of 2008 and 2009, many small businesses also went into financial crisis and finally closed. (Dullien, Kotte, Márquez and Priewe, (Ed.), 2010; Verick, and Islam, 2010). The recent economic and financial crisis of 2008-2009 and the pandemic covid-19, are the two major causes, among others, that have led international trade to undergo at the brink to world economy collapse. Many of these leverages are activated especially during periods of economic crisis. In this regard, conclusive evidence follows from the reaction of highly developed countries (Japan, USA, Germany, France, UK etc.) to the negative effects of globalization.

Keynesian anti-cyclical fiscal and monetary policy was effective in overcoming the Great Depression crisis and the international financial crisis of 2008-2009. However, these types of policies create addictions that end in fiscal deficits and greater indebtedness. Global trade growth in the 10 years before the 2008-2009 financial crisis was about 6 percent, and in the years after 2009 it was about 2.5 percent.

The economic globalization process has the tendency to have been slowing down since 2004 (Bello, 2004) and increasing later after 2008 as the consequence of the economic and financial crisis with a slight decrease of the pace after 2004. The economic crisis led on serious consequences due to the slowdown of the globalization processes experienced not only by developed economies but also by developing economies and their reintegration processes has been stagnating. Amid the economic and financial crisis of 2008-2009, many small businesses closed their operations.

The slowdown in economic activities in the most developed countries is motivated by reductions in exports and imports relative to GDP. Countries that increased their exports and in attracting foreign investment to sustain their economy now face great challenges outside of a model of globalization and free market and trade integration.

It was reported in 2010 that some world globalized cities have declined significantly in relative financial services connectivity as the result (Hanssens, Derudder, Taylor et al. 2010: 11; Derudder, Hoyler and Taylor 2011: 4). Contemporary globalization processes show different traits from previous

globalizing trends such as the rate of change in the economy, the speed, quantity, scale, and scope of commercial exchanges, giving rise to a more interdependent system (Ritzer, 2011). However, the risks of globalization have increased with events such as the attack and demolition of the twin towers, the outbreak of the dot-com crisis, the tsunami that destroyed the Fukushima nuclear plant in Japan and the financial collapse of Lehman Brothers. The impact of the crisis on globalization carries enormous risks that imply profound changes at the individual, organizational, government and national levels.

Traditional industries have gone to China because the low labor costs and environmental regulations, but as soon China started to rise them business industries are moving to other places where they can benefit from labor costs and environmental regulations. The winners from globalization processes will be the losers from globalization. In 1916, China achieved reduced rates of economic growth due to lower levels of international trade. To sustain and even revive economic and commercial activities, China implements economic policies. Global investment flows are also slowing down due to tighter regulations. In 2017, global foreign direct investment fell by 16% and in 2018 by 27%. Globalization was at the center of the world economy for a period of four decades in which China became the world's factory.

Economic globalization showed signs of exhaustion in 2019 with the contraction of trade flows, for the first time since 2009. Trade wars, the weakening of multilateralism, the paralysis of trade agreements and treaties are expressions that show the exhaustion of the economic globalization model. International trade flows grew by 1.2% in 2019, the lowest growth rate in the last decade due to certain deglobalizing forces beyond trade wars.

THE IMPLICATION OF THE SANITARY CRISIS IN THE GLOBALIZATION-DESGLOBALIZATION PROCESSES

Economic globalization contracted in 2019 and is exacerbated in 2020 by the health emergency that can cause a prolonged disengagement of commercial and financial activities from the world economy driven by businesses, governments, and households in developed countries. However, the health crisis has immediate and profound effects on the processes of economic globalization that affect all economies.

The processes of economic globalization are in difficulties, showing a contraction in international trade flows in 2019, which are aggravated by the responses that companies have given to the health emergency. The outbreak of the coronavirus pandemic has immediate negative effects with a considerable impact on global trade, investment, and financial flows. Coronavirus is changing the way the world does business for bad or for good. Business corporations and companies are being forced to rethink their global value, production, and logistics chains, shaped to maximize efficiency and profits. Resilience, recovery, and adaptation are becoming relevant in the world economy (Javorcik, 2020).

An analysis was conducted by Abdal, & Ferreira (2021) on the dynamic process of globalization and deglobalization in the context of recent development in the capitalist global economy restructuring processes. Based on the effects of the 2007-2008 financial and economic crisis and the current COVID-19 pandemic, the authors argue that this last crisis tends to accelerate and deepen a global ongoing fragmentation processes of economic, productive, and commercial processes.

The health crisis generated by the pandemic has confirmed that dependence on the provision of resources, goods and services from remote locations has direct effects on global trade. With the impact of the pandemic, the effects on governments, companies and households are devastating in terms of debt, unemployment, loss of income due to slow economic activities and consumption.

Critical Analysis of the World Economy and Deglobalization Processes in Times of Pandemic

The coronavirus crisis plays an important role in deepening the transition of globalization processes from one more phase of international cooperation to a more conflictive one, which began after the economic and financial crisis of 2008-2009 and in which it is perceived that the risks outweigh the benefits. However, it is difficult to sustain the arguments that the health crisis has changed the logic of economic globalization processes. What has become clear is that the pandemic crisis has accelerated the trends that were set in motion since the financial economic crisis of 2008-2009.

Unlike the crisis of 2008-2009, the current health crisis has abruptly and profoundly paralyzed a large part of the markets at all levels. An important indicator to measure the impacts of these two crises is to compare unemployment, which has only taken 6 weeks in the current crisis to reach the same level as in 65 weeks in the 2008-2009 crisis. There are sufficient elements to support with evidence that the global economic scenario is one of a greater collapse in the economic growth of the more developed economies than that of the previous economic and financial crisis of 2008-2009. Among this evidence are the fall in production and demand in international markets in all economies without the possibility of meeting the fall in domestic demand in national markets.

The global economic and financial crisis of 2008-2009 and the health crisis of 2020 deepened the negative effects of globalization, the increase in economic inequality, the dislocation of jobs, the systematic destruction of socio-ecosystems and the loss of biodiversity, uncontrollable and unsustainable consumerism, etc. Trade wars and the coronavirus crisis put the continuity of globalization processes and the international trade system in checkmate. Trade tensions reflect the influence of China's economic management approach with a completely different set of values than the more developed economies, one of the factors that has given rise to trade wars. The health crisis of the pandemic has collapsed global trade and that must be faced with supranational institutions that are weak and without leadership. Human movements, tourism and immigration have been disrupted.

Cross-border lending networks driven by large global banks declined during financial crises, with fewer lending banks and fewer interrelationships. The big global banks occupy the center of the network. The big global banks have reduced their operations by allowing the official banks of China to enter. In other words, with the global financial crisis, cross-border financing networks have shrunk but density has increased with greater risk diversification. Economic and financial crises have a strong impact on global banks that spreads through the networks, affecting loans to developing countries (Conesa, Lotti and Powell, 2020).

The current health crisis has had a greater impact on the world economy because it was accompanied by a drop in the prices of commodities and oil, unlike the crisis of 2008-2009. In this situation of the depression of the commodities market, in the pre-crisis there were difficulties in the financial conditions of the less developed economies, such as Latin America, unlike the crisis of 2008-2009, these countries had low levels of external public debt while some were already running surpluses.

The current context of the international economy shows powers in relations of conflict rather than international cooperation, sieges and commercial reprisals that complicate and make the development of globalization processes complex. The international coordination of governments resolved the international financial crisis 2008-2009. International coordination is essential to establish strategic agreements to determine global demand, production, and income. However, at present this coordination has been very scarce due to the polarization of interests involved in trade wars and the spraying of efforts demanded by the solution to the pandemic crisis.

POLITICAL ACTORS AND ECONOMIC AGENTS

The international economic organizations play a limited role in the economic regulation and control of the economic globalization process, factually leading the globalized world economy in a free and drifting situation. The deterioration of international and multilateral organizations constitutes a challenge for conflict management and humanitarian aid, especially when they are relegated by the West to focus on their domestic crises, increasing the risks of greater global instability. The United Nations has proposed as goals the achievement of the 2030 SDGs, which reinforce the idea of continuity in the processes of economic globalization, since, for example, objective 17 raises the need for global, private, and public alliances of the actors of international economic relations and globalization to achieve the objectives.

The world trade organization is harshly questioned by the rulings it issues that ultimately end in a trade war and threaten the economy with a global economy. Global trade relations are in tension between the countries that operate. The emergence of tensions in trade relations between the most advanced countries and before the health crisis, the indicators already indicated that a maximum point had been reached and that there was a stagnation in the integration of the factors of global systems. The globalization of economic relations is an economic model of the great powers and transnational companies on the less developed economies (Bauman: 2015, 7).

For the current global world to advance, it requires strengthening the coordination and collaboration of international institutions with better information exchange. Management of global risks is limited due to greatly diminished global leadership and international organizations. International cooperation systems with global responses are the way out of global economic crises.

A MNE has been defined as a company that belongs to one specific nationality which owns, in whole or in part, subsidiaries within other host national economies where owns property (Gilpin 2001, p. 278). Multinational and transnational corporations (MNCs) have been the main carriers of economic financial globalization, allocating resources and organizing production and distribution through the application of macroeconomic mechanisms to promote global territorial expansions of markets under the principle of profit maximization.

Many of the factors that benefited the United States and its multinational companies that allowed them to borrow, are linked to the star role of the dollar in the international monetary system, a situation that may change. The demand for dollar-denominated assets sustains the commercial and financial system. Financial globalization increases the profits of multinational companies and offers highly profitable investment instruments. The purchase of strategic sectors for the development of nations by foreign investment worries about the loss of their control. Competition among MNEs corporations improve their efficiency and their economic growth (Iamsiraroj and Ulubaşođlu, 2015).

MNEs locate in countries with more favorable regulations, where they can benefit from low wages, tax evasions, etc. Multinational companies that settled in other countries did so to evade labor and environment regulations, which are usually laxer than in their countries of origin, as well as to receive tax incentives. Multinational corporations have positive effects when they can contribute to national and local economic growth by creating jobs, although the distribution of these benefits may be unequal and asymmetric.

MNEs expand from a home country to other host countries through FDI flows which have been explained by the ownership competitive advantages, the competitiveness of location specific which benefits their exploitation through internalizing the markets for specific advantages (Dunning 1999). Investments from MNEs increase and improve resources and capabilities stimulating local development, contributes

to employment generation and development of human resources, among other benefits (Sanna-Randaccio and Veurgelers, 2003; Barrios et al, 2003; Feldstein, 2000; Gilpin 2001; Bhagwati, 2004; Wolf, 2005; Sala-i-Martin, 2006). A MNE invest abroad either creating new infrastructure in greenfield or in existing one to have control of business activities in services, manufacturing, extraction, and exploitation of natural resources abroad (Gilpin, 2001; Dunning and Narula, 1997).

MNEs and corporations have been harshly criticized for the effects of their activities in the host countries and the cost-benefit analysis (Duran, 2001). Critics against MNEs argue that exploit workers by paying lower wages in less developed countries despite the empirical evidence that proves the opposite (Brown et al, 2002; Graham, 2000). Multinational companies distrust operating principles based on the integration and interconnection of global flows of production, investment and consumption and the resolution of trade and investment disputes by multilateral institutions.

Some activities of MNEs corporations have harmful consequences in damaging the environment, facilitating corruption and bribery, and producing harmful goods and services, while exploiting the local natural resources, the biodiversity, and ecosystems, leaving behind environmental pollution and contamination. However, to defend their interests from the action of local communities and governments, multinational corporations can pay the best lawyers and lobbies in international institutions and organizations that protect them against sanctions in this case, or to apply sanctions against local governments that infringe royalty payments for use of intellectual property rights and patents (Bhagwati, 2004: 276).

These problems affect people and local communities in less developed countries and should be solved using multilateral and unilateral approaches sanctioning denounced abuses of multinationals. International and national laws and the actions of civil society and local communities can have a relevant role to regulate and sanction.

The Globalization Index is based on 25 variables covers the issues of economic, social, political, and cultural globalization flows at national level and their macroeconomic instruments and policies (Swiss Economic Institute 2013). The degree of social globalization includes freedom of information and quality of life with indicators such as internet and telephone use and traffic, movements in the tourism sector, etc. In some national cultures, religion in the local particularization in contemporary globalized society is considered antisocial and conflictual because the autonomous power structures evolved in the way out of secular institutions. In these national cultures, religion in a national society is incompatible with the new global society

However, developed economies have added more restrictive measures for imports and exports, and there are still many barriers to free trade such as tariffs, taxes, subsidies, etc. The increase of SWF could control some developed economies rising concerns for more clear regulations on transparency investment decisions and policies, financial risks control and management, fair competition, and international financial instability (Surendranath et al 2010).

The knowledge network flows on demand and supply relationships provides relevant information on the governing relationships management between the world financial cities and the variety of partners. There are very few studies of World cities and globalization and their role in decision-making capacities in urban systems (Friedmann, 2000, 1986: 70, 73 ff.; Sassen 1991: 127 ff.; Beaverstock, Smith and Taylor 2000: 125 ff.; Derudder, Taylor, Witlox et al. 2003: 876 ff.; Taylor 2004: 175 ff.; Robinson 2005: 757 ff.; Hanssens, Derudder and Taylor et al. 2010: 2 ff.; Lüthi, Thierstein and Goebel 2010: 115 ff.).

Theorists and organizers of anti-globalization movements and for global justice call for action. Anti-globalization movements argue that economic globalization has increased the income inequalities and

suggesting the need to design and implement another integration strategy into the international economy and trade.

Economic projections also reinforce the dynamism of economic interactions with the leading role of new actors and change in leadership.

ARGUMENT IN FAVOR OF ECONOMIC GLOBALIZATION

Globalization means good opportunities but also responsibilities. Economic globalization processes have benefits, opportunities, challenges, and problems related to the internationalization of economic activities. Economic globalization has brought challenges and opportunities than have changed the global scenario. However, the consolidation process has had disappointing results in prosperity. The benefits of globalization policies must continue extending openness and economic integration while alleviating their negative side effects. The integration of financial and goods and services markets has evolved faster than the movements of services and labor.

However, some analysts argue that the benefits of globalization have reached everyone equally and because it has deepened dependence on certain raw materials and inputs. The increased dependence of the local economy on other foreign economies also increases the risks of losing control of supplies and supplies of inputs.

The increasing acceleration of economic, trade and investment exchanges has fostered a strong global development and economic growth and created economic wealth uniquely distributed. Economic globalization has direct effects on people's lives by allowing direct access as producers and consumers to goods and services in international markets where local economies contribute what they have comparative and competitive advantages. The global consumer increasingly prefers less standardized and more personalized satisfiers that fit their specific needs, wants and fears.

During this period of ascent of globalization processes, there are advances that cannot be haggled as, for example, the increase in global GDP that has multiplied by 62, global life expectancy has increased from 52 to 72 years. Globalization processes are redefined after three decades of economic growth while promoting economic, commercial, and financial exchanges without borders in a more open society.

The trade liberalization policy mix allows taking advantage of globalization (Gurgul and Lach, 2014). Some empirical studies confirm that national economies with higher level of trade liberalization have increased the living standards (World Bank 2016, Frankel and Romer 1999, Sala-i-Martin, 2002 and 2006, and Dollar & Kraay 2001). Other studies analyze the trade effects through regressions on the GDP per capita growth, although Rodriguez and Rodrik (2000) argue that trade liberalization is measured by the proportion between GDP and foreign trade. There has not been found direct correlation between trade liberalization and economic growth as a factor to reduce global inequalities and between each country.

Empirical studies have found association between financial liberalization and macroeconomic instability, but in the other hand, have not identified a direct relationship between economic and financial liberalization and sustained economic growth in developing countries (Stallings and Studart, 2006, Prasad et al, 2003; OECD, 2013; Tamarauntari and Diseye, 2013; Yahya et al 2015). The so called "Tobin tax" is a proposal made by Tobin, (1978) to tax any financial transaction.

Technological innovation has fostered trade liberalization supported by a decrease in tariffs and taxes which in the long run are associated with facilitating innovation, increasing productivity and positive results in economic growth.

Institutional innovations developed the market economies advantages which resulted in efficiency and legitimacy of markets. The capacity for innovation is the essential characteristic that motivates and energizes the world economy and markets. The capacity for innovation is the essential characteristic that motivates and energizes the world economy and markets. Globalization promised to boost prosperity by enlarging and making more efficient the markets.

Economic globalization has contributed to have more influx of information around the world. Speedy mass communication and dissemination of information through digital means is growing very fast. Local and national cultures are intermingling shared, and people are exposed and learning from other cultures.

Governments and corporations concerned with ecological and environmental sustainability are talking more trying to sort out the responsibilities between each other.

THE TURNING POINT: ARGUMENTS AGAINST THE GLOBALIZATION PROCESSES

The liberal economy and the emerging globalization after the Second World War are currently being seriously questioned, even by the countries that promoted it the most. Although globalization processes promote modernization and economic growth in the winning countries, they also generate inequalities and socio-economic inequalities in the losing peoples that give rise to social tensions (Molano, 2007: 12).

The arguments against economic globalization sustain that countries and people who remain outside of this elitist economic process, should consider the elements of the open flows of trade and foreign investments processes, to identify the way to take advantage of any potential benefit for national economies from their insertion from economic globalization. The growing insecurity in investments and international trade is negatively affected by the lack of effective control mechanisms in strategic sectors.

Economic and financial globalization have effects on all economic activities rising concerns on issues of ecology and sustainable development, use of renewable resources and energy, limitation of gas emissions that accelerate climate change and corporate social responsibility, among others. Climate change is a sign that the wealth of nations is changing in the 21st century from a base of unlimited growth marked by the beginning of the end of an economic expansion that is not compatible with the limits set by the finite resources of the planet, to a different mechanism connected with mitigation and reduction. The UN Climate Action Summit 2019 (COP25) does not refer to growth but to the mitigation and reduction of CO₂ emissions.

Economic globalization processes of production, distribution and consumption has negative effects on the depletion of natural resources, loss of biodiversity, destruction of ecosystems and sustainable environmental development. Production exceeds effective demand. Transportation and logistics are responsible of environmental problems such as gas emissions, air pollution, plastic pollution and are the main cause of global warming.

The current processes of unbridled globalization are criticized because the effects have not been as expected because it only benefits a part of the world population and provides opportunities for certain business sectors, but it generates the impoverishment of small and medium-sized local businesses, produces a growing wage reduction accompanied by job insecurity, which is intentionally implemented as a strategy to reduce production costs.

The effects of trade liberalization on economic growth are confusing in some countries that undertake internal reforms, besides the difficulties to determine causality (Rodriguez and Rodrik, 2000; Rodrik,

2007; Steinberg, 2005 and 2007; Dollar and Kraay, 2001a). However, the benefits of trade liberalization are considered ambiguous by the new endogenous growth theory, depending on the comparative advantage provided by the economic resources (Rodrik 2007, p. 219).

Trade and labor market reforms favoring trade liberalization are related with an increase in income inequality (Brohman 1996). It is not clear if income inequality is caused by trade liberalization. Trade competition has hit the lowest paid workers. Globalization by itself does not guarantee the well-being of all. The dynamics of economic globalization have strengthened socio-economic inequalities and hierarchies of authority that victimize workers and local cultures subject to their localities. The loss of national identity, due to globalization processes is argued in favor of a homogenization of global cultural identity. For example, minority local languages tend to disappear.

In those nations where there are no fiscal compensation mechanisms, the benefits of globalization go hand in hand with an increase in the levels of inequality. The lack of fiscal mechanisms to compensate for income inequality makes it more pronounced. Therefore, fiscal policy must be oriented to be redistributive of income that benefits those with fewer resources to increase their consumption and demand and therefore tends to reduce poverty and economic inequality, as well as increase economic growth (Piketty, 2014).

Despite that the orthodox theory argues that free trade promotes increases of income, Berry (1998) argues that in Latin America the income inequality increases when the trade liberalized increases. Free trade is questioned for its compatibility with the principle of equal opportunities. These situations lead to high income disparities, declining wages and higher economic and social inequalities and exclusions being the more unskilled workers the most affected for lack of opportunities and mistreatment. The race-down trend in reducing wages and salaries as a strategy to promote economic growth only reduced private consumption which is required by investments and therefore diminishes the global market (Stockhammer 2012).

The market as the best mechanism to allocate resources that generates economic growth has resulted in non-sustainability. The markets have a very complicated evolution due to the health crisis that has serious implications in logistics and supply problems, work management, erratic impact on demand, oversupply and reduction in consumption, changes in the behavior of consumers who prefer non-perishable products to perishable ones, management at points of sale due to decreed closures, fear, or lack of supply of merchandise.

Inequality is increasing and become deeper, damaging an already unfair society. Global inequality has declined in some countries due to the globalization benefits in economic growth (Sala-i-Martin 2006). Economic globalization has favored the strongest economic sectors and the rapid growth of the so-called BRICS and the inequality between countries seems to have decreased. However, other studies have found the increase of inequality within each country and changes in income distribution may not be related to the development of international trade (Bhalla, 2002; Dollar and Kraay, 2001a; Wolf, 2005, Majeed, 2016).

Longstanding incentive systems and structures of economic globalization have some perverse economic, social, and environmental effects. Economic globalization processes have opportunities, challenges and problems related to the internationalization of economic activities. When the globalization processes blew up, they have caused extensive collateral damage leading to the inevitable backlash.

World economy has integrated countries in very unevenly and different degrees due to the power of international structures and reliance in market forces (UNDP 1999) resulting in tensions, inequalities and socially constructed gendered impacts on components of institutions and organizations of economic

globalization. Globalization has created more social and economic inequalities, benefiting the richer who gets richer while creating more poverty.

Since 2008, developed countries are experimenting dysfunctionalities of international financial markets. The processes of globalization are causing the increased volatility of the financial and currency markets, the increase in unemployment and the precariousness of employment, the impoverishment of the middle classes, the mediocre economic growth of emerging economies. Emerging and less developed economies are the most vulnerable to the impact of the global economic crisis because they already had problems of low economic growth, and a high level of dependence on commodities. Emerging economies that had increased their levels of trade since 1990 have been affected by a decrease due to the commercial and financial crisis of 2008.

Most of the trade agreements have cost many jobs, dysfunctionalities, and trade deficits for some countries. The free trade agreements promoted by the globalization processes aimed to eliminate free trade barriers, but some countries have imposed more import and export tariffs, valued added taxes, subsidies, zoogenic and phyto sanitary barriers, etc. Multinational and transnational companies exploit the tax heavens to avoid payment of taxes.

Globalism destroys the sovereignty and borders of nation states. National and local governments have diminished their sovereignty and the institutional efficiency to enforce regulations, establish redistributive policies to improve the social wellness and manage the financial crisis. Globalization is criticized and questioned for its inability to prevent or at least mitigate financial economic crises.

Economic globalization process provides more development opportunities but also is posing enormous risks by expanding the gap between developed and the few developing countries benefited, marking the differences in income per capita, the value of foreign trade, etc. Emerging economies are driven by exports to developed countries of natural resources, raw materials and consumer goods showing signs of exhaustion of the model.

Despite that trade liberalization may have positive effects on economic growth, the effects on income distribution are not clear (Ezcurra and Rodríguez-Pose, 2013). Some developed economies have trade imbalances with negative effects on less developed countries. Developed countries lost jobs by the transferences to lower labor costs countries. Workers have little leverage to face pay-cut demands from their employers in developed countries creating a culture of fear.

Despite that economic globalization processes have contributed to increase the standard of living, has also negative effects on emerging local economies and workers. The middle class in developed economies that used to have economic strength, are dissatisfied from the economic globalization processes which has represented a threat to the living standards. Competition has not always driven prices down because countries can manipulate currency exchanges to get a competitive advantage based on price over other nations. Although globalization has increased the living standards of a large part of the world's population, it has also generated large gaps in economic inequality and a rapid deterioration of biodiversity and socio-ecosystems.

Globalization processes have increased levels of job insecurity due to a considerable reduction in wages as one of the strategies to reduce costs and increase competitiveness at the expense of workers. While consumers benefit from great variety of goods and services, better quality and lower prices, communities that are dependent on jobs outsourced elsewhere have difficulties to sustain competing with lower cost labor markets always under the threat of corporations in a race to the bottom. The imported low-price goods and services do not match the decline of wages and family wage jobs.

Economic globalization processes have led to exploitation and degradation of labor, such as the case of child working with the lowest wage, health, and safety standards in inhuman and insane working conditions, increase of human trafficking for slave labor. Labor skills are marketed around the world which most of the times cause conflicts in local existing labor markets with the wages that are pressured downward. Labor restrictions that prevent the hiring of the best global talent limit the competitiveness of companies and the national competitiveness of the countries that impose them (McGrew, 1990)

Transnational and multinational companies invest in installing manufacturing plants in less developed countries providing employment, while most of the times these jobs are precarious. Multinational and transnational corporations take advantage of their situation in weak and less developed countries where they commit social inequalities and injustices creating unfair working conditions and lower living standards, mismanage and exploitation of natural resources, environmental sustainability, and ecological damages.

The existing WTO rules cannot have control over non-market measures to favor specific trading partners. The international negotiation mechanism has been incapable of mediating international trading disputes.

CHANGES OF THE CURRENT ECONOMIC GLOBALIZATION DUE TO THE PANDEMIC CRISIS: DEGLOBALIZATION

The entire global economic structure is reeling from the health crisis of the pandemic. Governments of Nation states and corporations are assessing the global market as a growing source of disruption of global value, production, and logistics chains, as well as the source of risk and competitive disadvantages. Local governments are retracting global policies of economic integration and are increasing the protectionist policies for repatriation of manufactures Abdal, & Ferreira (2021). However, other national economies have already developed capabilities to become resilient, recovering, restructuring, and enhancing the new institutional governance emerging from the pandemic.

Today's globalization faces challenges that put it at a crucial turning point. The world economy entered a negative growth trend in the last four years with an accumulation of problems such as the indebtedness of individuals, companies, and national governments with high levels of public deficit, disputes and trade wars, changes in the stock markets, etc., among others.

An internal orientation with an inward look at the national economies created the perfect environment for a decreasing trend of reduction of international trade and financial ties in such a way that those who had no other options to modify their economic growth strategy were harmed. The increase in tariffs in each country and trade tensions between the exporting economies, the reduction in the activities and profits of the multinationals, among others, are trends that are aimed at proportionally reducing financial globalization. In economic globalization, nations export goods and services.

The governments of countries with a populist tendency support policy that put an end to the processes of economic globalization, with measures to close borders due to the health emergency, greater control of migratory movements of the population, trade wars and polarization of commercial exchanges. The health crisis of the pandemic results in very negative indicators with the loss of millions of jobs and the bankruptcy of millions of companies, salary falls, increased levels of inequality and poverty, greater concentration, and monopoly control, etc.

The health crisis of the pandemic is affecting all sectors of production, distribution, and consumption, causing major changes in consumer behavior, in the nature and routines of telework, problems of logistics

and supply of satisfiers, etc. many of the causes that give rise to consider the scope of the processes of economic globalization. Consumption, for example, is retracted and stopped because of the confinement that implies less exercise and physical activity.

The results of the consolidation of economic globalization processes resulting from the implementation of expansive and invasive strategies have been very different from those expected due to the high disparities in the distribution of wealth that have given rise to staggering levels of poverty. The global health crisis brought de-globalizing implications for the economy with a decrease and slowdown in the processes of integration and interdependence. The processes of world economic integration are in decline in all sectors.

Analysts foresee a period of deglobalization following the pandemic and the lockdown where countries and people tend to stay behind their borders despite that the incomes are going down and costs are going up while individual are getting poorer. Countries are tightening their geographical and commercial borders while increasing their restrictions. Bello (2005, 2013) published deglobalization suggesting that it is possible to give other content. The globalization processes were already in decline before the health crisis of the pandemic dealt the great blow to all national economies and therefore to the global economy, in addition to showing the weaknesses and failures of the system on which it is based.

The coronavirus has spread worldwide as a by-product of globalization processes, showing its weaknesses. The health crisis of the pandemic has negative effects on long-term international trade. National governments are now more aware of strengthening the capacity of public health systems considering it to be a national security imperative.

For other analysts, the de-globalization processes are only a short-term effect of the crisis with a decrease in investments prioritizing the local market. The interests of local elites that converge in the hegemony of local governments legitimize economic policies, although they are not necessarily based on a legitimization of economic behavior. The massive inflow of money into a local economy specialized in primary sectors that are deindustrialized, impoverished, and distorted into Dutch disease also known as abundance disease. This situation leads to deep local financial crises in very different ways (Reinhart and Rogoff, 2013) Many of these links are difficult to disappear.

The processes of economic and financial de-globalization propose that local economies should be reoriented in short circuits towards production for local consumption, avoiding the relocation of companies that generate competition because they seek places where labor costs are lower, production standards and ecological are less restrictive, etc. Financial chaos justifies the concentration of power in financial centers. However, there is no chance that the financial economic elites will be destroyed.

The phenomena of the redefinition of territorial boundaries of the countries and of national identities are not phenomena, although many of the times they are contradictory, that reconfigure globalization processes but rather the continuity of a new stage of the processes of more aggressive, exclusive economic globalization and dangerous than the previous ones for the harmonious and inclusive coexistence of nations. Taking the export of work and the production of companies to other countries and depending on inputs and resources from distant territories, what before was considered an efficient system now turns out to be risky.

Among other important factors for the territorial organization of production, distribution and consumption activities, access to raw materials, availability of skilled labor, costs, strategic location close to global markets, etc., are considered. The manufacturing industry has already begun the return or re-shoring of some of its productive operations that it carries out offshoring, due to causes such as the trade

war and the coronavirus health crisis. Re-shoring is strengthened with the automation of activities, also allowing the diversification of the supplier base and with the support of the national economic policy.

The systemic risks of economic deglobalization processes can have effects on the economic viability of the business. Among the causes of the processes of slowing down and reducing globalization is the volatility of international markets that has increased in recent years, which causes financial risks to increase with a tendency to decrease international investments and to invest more in local markets, the commercial exchanges in exports and imports are reduced.

This period of deglobalization has implications for international business and companies. Economic policies are shifting towards different forms of globalization promoted by various forms of national production. The national governments of the most developed countries focus their economic policies on favoring domestic demand in their markets.

The Munich Security Conference (MSC) (Munich Security Report 2020) focused on the phenomenon of de-westernization that poses the withdrawal of the world economy as an illiberal trend characterized by the lack of a common strategy that results from disunity. Currently the North American government speaks out against the excesses of the advances of commercial globalization and does not commit itself to the exercise of intellectual leadership.

It can be argued that commercial exchanges are changing form as in the cases of international tourism and migratory movements of people. The process of globalization of the flows of people in a context of global talent has caused a notable migration from emerging economies to developed economies and is expressed in part by the human drama of the refugee crisis, although the total percentage in absolute terms of the migratory population has remained stable for the last 100 years. Greater control of the migratory movements of people, but especially of talent, which is a global resource, has consequences in the labor field, among others, the redefinition of labor relations and the extension of telework as a labor modality.

In the face of deglobalizing uncertainty, autocracies develop a greater capacity to survive the challenges of globalization and take advantage of the freedom of action to review the international order at the cost of weakening the regime of civil liberties and universal human rights. However, these proposals from the extreme right are linked to racist claims and immigration status. Reversing or slowing down the processes of economic globalization will mean changes in the practices and activities of multinational and transnational companies.

The free trade mechanism promoted by globalization is heading towards trade wars between the great trading powers through huge deficits that seek to de-globalize previous advances through a new managed trade. The threats of a trade war weaken the world economy and its impact is uncertain if the current system of international cooperation breaks down. Because of the trade wars, business strategies have been changed; global supply networks are replaced and reconfigured by shorter ones so that they are more resistant to disruptions due to shocks.

All global supply channels that had been established in international trade have been impacted by the closures of national economies, which perceive that they must depend on themselves with economic policies that, before continuing to look abroad, now must look to the outside. The impact of this strategic change in companies is affected by increased costs, reduced efficiency, and increased prices to the final consumer.

The redefinition of globalization processes marks a new way of carrying out cooperative relations and integration of international economic relations.

The left has always opposed the optimistic accounts of the imperialist globalization project and it seems like they are proving their arguments that another world is possible for the explosive growth of

poverty and inequality. A viable alternative as a sample is the emergence of large self-centered spaces that are constituted as poles of economic, political, social, cultural and civilization power.

DISCUSSION OF THE IMPLICATIONS FOR GLOBALIZATION

The global economic system has been in chronic crisis for more than half a century. If the world economic history is analyzed, the processes of economic globalization have not been linear. In fact, the dialectical developments of increasing economic, financial, trade, people and ideas toward a more integrated world economy is followed by the opposite movements in the direction of deglobalization. The global economic system has been in chronic crisis for more than half a century. The dynamics of globalization processes have been interrupted by decisions that put into question the world economic system that facilitates exchanges through commercial, financial, people and information flows.

The processes of economic, commercial, and financial globalization have contributed to many nations increasing their wealth with the opening of their markets to international trade, while many nations have been ruined, mainly those that remained closed. History provides evidence that those nations that resist signing free trade agreements under equitable conditions, block their development in some way.

Globalization requires sustaining itself on values, cultures, ideas, ways, and trends that promote the uniformity of tastes and traditions so that they are shared by local communities in such a way as to develop the existence of an international community. Culture, values, traditions, etc., have been changed by the economic globalization. The integration of globalization must be spontaneous and not interference by right or obligation that emerge from the evolution and socio-cultural development of peoples. What has been erroneously called uni-globalization refers to the assimilation of cultures, values, customs, traditions, habits, etc. that are replicated in a single direction and with commercial and economic effect

Economic globalization is becoming deindustrialization of some developed countries due to the outsourcing practices in both manufacturing blue- and white-collar jobs. National economic policies and strategies are designed and implemented to make economic globalization processes more equitable. Economic and financial globalization may be more transformational transition oriented towards more ecological and sustainable world if the environmental concerns are treated as a coordinated response of all agents and actors for a global synergy.

The transition from globalization to the post-global phase is identified with a greater awareness and responsibility for socio-ecosystems, biodiversity, and the quality of life of people and their population-spatial burden, taking the economic side into the background. Some of these concerns that require coordinated efforts are the reduction of gas emissions and waste, transition to renewable energies, etc.

The health and economic crisis have given rise to rethinking the entire business ecosystem. Global competition must play the same rules and regulations (Lascurain and Villafuerte, 2016). Greater global scalability of production in global companies can increase competitiveness but reduce competition and innovation capacity.

International institutions and national governments are redefining their roles as instruments to find better integration processes into the global economy. Globalization processes must redesign institutional structures or create new institutions to build integration based on the socioeconomic and ecosystem needs of nations and communities of all peoples. It is necessary to establish agreements on binding international mechanisms to address economic and financial crises. Also, it is necessary to implement

expedited procedures in customs for the import and export of goods that are critical to its sustainability, while promoting and enhancing international agreements and treaties.

Environmental sustainability is one of the great challenges. The recovery from the economic crisis caused by the pandemic and followed by a global recession is an opportunity to reset the world economy based on more sustainable development. Economic globalization processes are leading to the worldwide spreads of human diseases. The initiative to change economic relations in the processes of globalization that originate ecological imbalances, due to an orientation towards greater care for the planet's ecosystems, implies recognizing the finite limits of natural resources and ecosystems, a greater respect for cycles vital of nature and the environment, decarbonize productive activities to preserve the biodiversity of natural resources.

Another challenge of globalization is to achieve a better equitable distribution of global benefits in such a way that it closes the gap of economic and social inequalities and allows people from emerging countries to get out of poverty. Emerging countries require a financial architecture with support mechanisms to regain liquidity and access to international financial markets. Countries that require solvency need to restructure their debt with the support of multilateral institutions and facilities that give more support to their debt markets.

The impact of the processes of economic globalization on the economic growth and social development of the countries explains the increase in inequality. An entirely free global market seems to be an unattainable goal. From 1960 to 1998, the period of rapid growth in international trade and investment economic and social inequalities have worsened. Economic organization is socially digested when it does not involve a destructive acceleration of growth. Multilateral trade relations are under review to guarantee greater autonomy for global economies. Economic globalization processes are not working to benefit most people around the world.

Globalization processes create multiple forms of cooperation. The interests of less developing countries need the development of a new international economic order changing the conditions of the current economic globalization model as the base of an old international economic order that cannot contribute to develop a fairer and reasonable new international economic order to benefit developing countries. The national economy needs the complementation of the international economy to achieve self-sufficiency in agricultural and industrial production. The interests of developing countries must have to be respected and enlarged in such a way that their development may result in larger share of growth.

For this reason, developing nations need to participate and negotiate actively on the economic globalization process to achieve a significant share on development provided the big interests that developed economies must take advantage of the benefits. The benefits obtained from the new international order of the world economy should be made available for the improvement of development to all the participating countries, not only a few ones. However, in the long run the economic interests of developed countries would be affected if developing countries do not benefit.

The debate on globalization points to the implementation of a more inclusive model in such a way that the losers of the more advanced process receive compensation through the implementation of active labor and income protection policies for the unemployed. It is required to analyze the situation, identify the risks inherent to globalization to establish regulation and control measures. The de-frontierization initiative as a proposal for the reconfiguration of the current phase of globalization to allow the free cross-border transit of people, promoting diversity, would be a more solidary and fraternal world, but unfortunately it is utopian.

Achieving an economic recovery to achieve previous levels of income and employment requires reactivation instruments.

Globalization has fostered the attachment to the material and consumerism over the exercise of ethical values and social solidarity.

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KEY TERMS AND DEFINITIONS

Deglobalization: Process of reduction of international exchanges of goods, services, workers, money, etc.

Economic Growth: It indicates that there is an increase in terms of income or of the goods and services that the

Financial Crisis: It is that economic disturbance that is originated by problems associated with the financial or monetary system of a country. The financial crisis, therefore, is not due to problems in the real economy of a country.

Inequality: The quality of being one thing different from another, or of being distinguished from another by having characteristics, values or traits that make it different. It is the opposite of equality.

International Trade: Is that economic activity that refers to the exchange of goods and services between all the countries of the world.

World Economy: It is that branch of the macroeconomic economy whose mission is to address all the economic actions that a country maintains with the rest of the countries and that can be of a different nature such as: commercial, financial, tourist and technological.

Chapter 13

Do Family Control and Macroeconomic Fluctuations Impact Firm Performance? Evidence From Portuguese Listed Firms

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ABSTRACT

This chapter aims to analyze performance differences between family and non-family firms. Additionally, it aims to see if economic downturns and upturns cause impact in this relation. For it, a panel data of Portuguese non-financial-listed firms in Euronext Lisbon during the period from 2010 till 2019 is analyzed. Performance is studied in accounting-based and market-based views. Three types of variables are considered: corporate governance characteristics, macroeconomic factors, and firm's characteristics. Results depend on the performance proxy used. While to ROA no difference is found, Tobins' Q family firms outperform non-family ones, but results are the inverse using ROE, MTBV, and MVA. Moreover, macroeconomic fluctuations are relevant to explain firms' performance, specially to family firms. Therefore, firms must analyze specific characteristics to avoid losing value, especially in crisis periods.

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INTRODUCTION

Family firms are present all over the world, with firms from different dimension and sectors (La Porta, Lopez-de-Silanes and Shleifer, 1999; Prencipe, Bar-Yosef and Dekker, 2014). It is estimated that family firms are around 65-80% of worldwide firms, contributing 70-90% to the gross domestic product (GDP), and 70-80% to the employment (Villalonga and Amit 2006, Miller, Le Breton-Miller, Lester and Cannella Jr, 2007; Associação Portuguesa de Empresas Familiares - APEF, 2021). These facts prove its great impact on every economy's wealth.

Family firms present singular characteristics, which impact financial reporting decisions, making this type of firms apart from non-family ones (Basly and Saadi, 2020). Therefore, understanding these singularities and its impact on firms' performance is crucial to sustain the firms' growth.

The debate of family contribution to firm performance has gain significant attention in the last years and is gaining prominence in management and financial research (Basco, 2013; Martínez-Alonso, Martínez-Romero and Rojo-Ramírez, 2020).

This work aims to understand whether family firms outperform non-family ones, which can justify the prevalence of this type of firms in the world. Moreover, it intends to verify if there are significant differences in financial performance in moments of economics adversities and stability periods, since in crisis periods firms have financial constrain, and usually its activity is reduced.

A sample of Portuguese non-financial listed firm on Euronext Lisbon from 2010 till 2019 is analyzed for this purpose. There is no consensus regarding the performance measurement (Vieira, Neves and Dias, 2019). Therefore, this work considers two perspectives by using Return on Assets (ROA) and Return on Equity (ROE) in a historical perspective (accounting-based view), and in a market-based view using Tobins' Q (TQ), Market to Book Value (MTBV) and Market Value Added (MVA) in a forecast perspective.

Moreover, the determinants used to explain performance are also relevant. In this work internal determinants, namely firm' specific characteristics are taken into account as most researchers in this area (e.g. Fama and French, 1992, Miller et al., 2007, Villalonga and Amit, 2006, and Martínez-Alonso et al., 2020).

Additionally, corporate governance characteristics and macroeconomic factors are also considered. Portugal is a civil law country, with few information' transparency (La Porta, Lopez-de-Silanes, Shleifer and Vishny, 1998). The single-tier system persists, the board of directors has great impact on supervision managerial decisions, the legal protection of investors is weak and there is a high level of ownership concentration (Fama and Jensen, 1983). Although, the impact of corporate governance characteristics on firms' performance is still scarce, even if it is relevant specially in family firms' context (Aldamen, Duncan, Kelly and McNamara, 2020).

Macroeconomic factors, namely downturn and upwards periods are also considered. Usually, during recession periods there are significant external shocks such as low liquidity, failure of customers and markets, decrease in revenues, increase in uncertainty, among others (Aldamen et al., 2020). This work intends to understand whether firm's performance differ due to market conditions.

Previous studies as Vieira (2014), Miralles-Marcelo, Miralles-Quirós and Lisboa (2014) and Vieira (2018) have analyzed the impact of Portuguese family control on firm's performance. This work not only analyzes a large and more recent period (2010 till 2019), allowing to confirm previous findings in this area, but also contributes to the stream of firm performance considering a new independent variable as proxies of firm performance – MVA (market value added), as well as by analyzing in detail the impact of macroeconomic factors on firms' performance. Additionally, a new variable of firm' specific char-

acteristics is also added as a new determinant of performance - the firm's efficiency measured as assets turnover, and results prove that it is statistically significant to explain firm's profitability. Finally, the models are estimated using the generalized method of moments (GMM), more specifically the two-step dynamic panel with equations at levels. This methodology helps to control the individual heterogeneity and specify the endogeneity problem in firm performance models.

Results of this study help the different stakeholders to understand which determinants impact the firms' performance. Moreover, it highlights differences among family and non-family firms, helping the understanding how firms' singularities impact its performance. The impact of economic cycle on financial performance is also evidence expanding the knowledge of market conditions dynamics. This work also contributes to corporate governance considering the link of corporate governance characteristics and financial performance. Thus, managers, owners and government can better understand firm's performance with regards to firms' characteristics, corporate governance, and macroeconomic variables.

The rest of the chapter is organized as follows, after this introduction topic, next section provides literature review on the topic. Then, the study hypotheses are presented. Data, variables, and methodology are introduced after. Discussion of results follows. The main conclusions are then presented, and the work finishes with suggestions and future line of research.

LITERATURE REVIEW

Family Firms

The presence and relevance of family firms to the world economy is unquestionable. Although, there is no consensus about family firms' concept. Three dimensions are usually included in most definitions: family ownership, family control and family members involvement in management positions (Miralles-Marcelo et al., 2014).

The European Commission (2009), after analyzing more than 90 different definitions, suggests that family firms should have the majority of the decision-making in the hands of the founder or descendent (spouses, parent or children), the majority of the decision-making rights (direct or indirect), at least one family member is in the firm's governance, and for listed forms, at least the firm should have 25% of the decision-making rights.

Family firms present several singularities which make them apart from non-family firms (Villalonga and Amit, 2006). First, the family control is unique, as well as its decision-making process (Miller et al., 2007). This type of firms is characterized by having a long-term orientation, a greater involvement in the firm's ownership and management (Gómez-Mejía, Cruz and Imperatore, 2014). Therefore, the agency costs, proposed by Jensen and Meckling (1976), between the principal and managers are eliminated or at least reduced (Anderson and Reeb, 2003). The public image, the family's identity, and the aim to pass on the firm to future generation are also characteristics of these firms (Lohe and Calabrò, 2017). This leads to intangible resources difficult to imitate, which bring value to the firm (Martinez-Alonso et al., 2020). There is a strong emotional connection between the family and the business, which sustain competitive advantages to firms (Gomez-Mejia, Cruz, Berrone and De Castro, 2011).

Although, other conflict of interesting appears (type II), between major and minority investors (Shleifer and Vishny, 1989). Family owners can expropriate the firm's and minorities' wealth by investing in projects that maximize family's profits. This leads to the entrenchment effect, also called external

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conflicts. In fact, based on the stewardship theory, the family may make decisions financially unprofitable to protect family interests (Gomez-Mejia, Haynes, Núñez-Nickel, Jacobson and Moyano-Fuentes, 2007). Moreover, family firms tend to follow more conservative strategies regarding risk taking, to distribute less dividends and their shares are usually more illiquid (DeAngelo and DeAngelo, 2000; Fahlenbrach, 2009).

These singularities of family firms can impact its performance in a different way it impacts non-family firms.

Performance

There are a vast set of variables which can influence firm performance, and no universal model to apply to all firms or specific group of firms (Vieira et al., 2019). Moreover, several proxies of performance can be used. These proxies are usually characterized into two groups: accounting-based and market-based measures.

Accounting-based proxies are calculated using financial statements, which gives an historical perspective of the firm's performance. Examples of these measures are ROA (Return on Assets) and ROE (Return on Equity) which show the firms efficiency to generate profits compared with total assets or total equity, respectively (Miralles-Marcelo et al., 2014). Although, these variables are country specific due to accounting legal standards (Vieira et al., 2019). Moreover, financial statements information can be biased due to earnings management practices (Rhoades, Rechner and Sundaramurthy, 2001).

Market-based measures are related with investor's point of view, depending on their expectations, being forecast measures (Miralles-Marcelo et al., 2014). Example of these proxies are MTBV (market to book value) and Tobin's Q (TQ). Although, these measures can be influenced by managers' decisions as well as earnings management practices to deal with investor's aims (Rhoades et al., 2001).

Regarding the factors that can explain performance there are also a larger number which can be used. It can be group in firm-specific characteristics, corporate governance characteristics and macroeconomic factors (Vieira et al., 2019).

Firm' specific characteristics are the most used determinants do explain performance (e.g., Fama and French, 1992, Miller et al., 2007, Villalonga and Amit, 2006, and Martínez-Alonso et al., 2020). Are example of this type of determinant: liquidity, leverage, firm' size and age, among others. These variables are chosen by managers and characterize the firm and its activity.

Corporate governance variables normally impact firm's decision, and thus, its performance (Vieira, 2018). Although, the impact of these variables on firm's performance is less explored. Aldamen et al. (2020) suggest that good performance practices with family ownership and long-term orientation deal with more transparency, better decision making, less uncertainty and thus great performance. The role of the board of directors, executive and independent members impact manager's decisions, as board members can control managers, avoiding entrenchment effects and enhancing the alignment of interests. Thus, firm's performance can change due to these variables.

Finally, previous researchers show the relevance of macroeconomic variables to predict firm's performance (Issah and Antwi, 2017). Recession periods lead to external shocks with great impact on firm's performance since revenues and liquidity usually decrease, uncertainty increase as well as firm's risks (Aldamen et al., 2020). Thus, managing a firm in recession periods is different than managing it in upwards periods.

HYPOTHESES

This chapter aims to understand whether family firms outperform non-family ones, and if there are performance differences among downturns and recovery periods. Thus, the following hypotheses were developed.

Family Firms

Family firms are the oldest and more common type of firms all over the world, so it is expected that these firms are financial efficient. For one side, a positive relationship is expected between family firms and financial performance. These firms are usually managed by a family member or the manager is highly controlled by the family, leading to an alignment of interests between the principal and the agent (agency cost type I is reduced). Anderson and Reeb (2003) found that firm performance increases with higher levels of family firms since managers are more concerned in maximizing the firm's wealth, rather than private benefits. Moreover, family firms have a long-term orientation and a desire to pass the firm onto succeeding generations (Lohe and Calabrò, 2017). Therefore, this type of firms creates sustainable capabilities, difficult to imitate, which brings value to the firm (Martinez-Alonso et al., 2020).

Although, for another side, family members may decide based on the best to the family, even if it might expropriate minority shareholders. Excessive compensation, special dividends, top positions in the firm even without enough knowledge are some examples of how family firms can focus more on the family's emotional wealth rather than on the firm's wealth (Villalonga and Amit, 2006, Gomez-Mejia et al., 2007).

Prior literature results are mixed. For one side some researchers found a positive relationship between family firms and performance (Anderson and Reeb, 2003; Miller et al., 2007; Sraer and Thesmar, 2007; Pindado, Requeijo and De La Torre, 2008). This relationship can be explained by the socioemotional theory. The family has strong sense of commitment to the firm and see it as an extension of the family heritage, so the family may have great incentive to add value to the firm, to assure the firm's growth and perpetuation (Patel and Chrisman, 2013). Moreover, communication is less formal in family firms and the decision process is less bureaucratic (Barontini and Caprio, 2006). The agency theory also contributes to explain this relationship since the firm manager is a family member, which supports a decrease of conflicts of interests between managers and principals (Miller et al., 2007).

Although, Cronqvist and Nilsson (2003) and Volpin (2002) found a negative impact. The agency and the stewardship theories can also explain it since the family may pursue actions to maximize their own benefits, serving the family interests, and expropriating minority investors – agency problem type II (DeAngelo and DeAngelo, 2000). Moreover, the family can also misallocate resources and offer top position to family members without any knowledge about the role (parental altruism), which can be translated in inefficient decisions with greater impact on firms' performance.

To Portuguese listed firms Miralles-Marcelo et al. (2014) and Vieira (2014) found that family firms exhibit at least the same performance as non-family ones. Our first hypothesis naturally follows:

Hypothesis 1: Family firms present similar performance than non-family firms.

Macroeconomic Factors

During macroeconomic recessions, firms have fewer opportunities to invest, not only due to market turbulences, but also because have less free cash flows (Aldamen et al., 2020). Customers usually reduce consumption, dealing to a decrease in revenues and in profits. Therefore, it is expected that GDP growth positively impacts firm performance (McNamara and Duncan, 1995). Moreover, financial markets usually react to market fluctuations, with great volatility of share prices, which impacts market's proxies of performance (Vieira et al., 2019).

Mitton (2002), McNamara and Duncan (1995), Issah and Antwi (2017) and Vieira et al. (2019) found that macroeconomic variables impact firm's performance. Thus, our second hypothesis follows:

Hypothesis 2: GDP growth positively impacts firm performance.

SAMPLE, VARIABLES AND METHODOLOGY

Sample

The sample includes non-financial listed firms on Euronext Lisbon, during the period from 2010 till 2019. Financial and sports firms were excluded since have singular accounting standards.

We choose Portuguese firms since Portugal is a small-size country (with less than 50 listed firms) almost unexplored, and where most firms are family type (APEF, 2021). The relevance of family listed firms is also relevant since around half of the Portuguese listed firms are family ones (Miralles-Marcelo et al., 2014).

Portugal is also a relevant case study with regards to the impact of macroeconomic cycles. It was quite affected by the international financial crisis of 2007/2008. Diverse firms went to bankruptcy and the public deficit increased to huge levels, calling the need of the country to look for international assistance. From 2011 till 2014 several contraction measures were imposed by Troika to help the country to surpass these difficulties. With regards to the impact of covid-19, the pandemic situation caused by coronavirus, Portugal was also too affected. Diverse countries have blocked travels to Portugal due to the high risk of contagious, which have difficulted the survival of several business, especially in the area of tourism and similar.

Due to the need of accounting information, the last year analyzed is 2019, before the impact of covid-19 in the country. Although, the period analyzed covers downturns and upwards years to see the impact of macroeconomic fluctuations on firm's performance, and to give insights to firms to help them to surpass financial difficulties caused by the coronavirus or other macroeconomic factor. The year of 2010 refers not only when Portugal asked Troika's help (the contraction measures were applied only in 2011), but also the year when the new Portuguese accounting standards were applied (SNC – Sistema de Normalização Contabilística).

Financial data was collected from SABI database of Bureau van Dijk, corporate governance variables from firm's annual report of corporate governance available in its webpages, and macroeconomic factors from Pordata database from Fundação Francisco Manuel dos Santos. Moreover, to classify firms into family and non-family firms, its history was analyzed on its individual websites.

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Our final sample (after deleting outliers and firms without corporate governance reports) includes 36 firms, with a total of 325 observations.

Variables

Performance is measured using different proxies, since there is no consensus which proxy is the best (Vieira et al., 2019). Two perspectives are considered: accounting-based perspective, based in a historical view, by using **Return on Assets** (ROA) (as for example, Villalonga and Amit, 2006, Miralles-Marcelo et al., 2014, Vieira 2018, Vieira et al., 2019, Aldamen et al., 2020) and **Return on Equity** (ROE) (Vieira, 2014); and in a market-based view, a forecast perspective, by using **Market to Book Value** (MTBV) (as for example, Villalonga and Amit, 2006, Miralles-Marcelo et al., 2014, Vieira, 2014, Vieira, 2018), **Tobins' Q** ($TQ = \text{Market capitalization} / \text{Total assets}$) (Vieira et al., 2019), and **Market Value Added** (MVA). All the variables are directly obtained in SABI Database, except MVA which is the difference between the market value and the book value per share (Tan, Zhang and Ma, 2011). This measure is less used, but it represents the excess of market value of capital over the book value of capital, being a long-term market performance measure. A positive MVA signals that investors believe that the firm's value is greater than its book value – the firm is creating value for shareholders, while a negative MVA suggests that the firm's value has been damaged.

DFam is a dummy variable which is one when the firm is a family firm and zero otherwise (Miralles-Marcelo et al., 2014, Vieira, 2018). We define a family firm as a company that is owned twenty five percent or more by a family, and with a family member on the board of director, to assure family control. This definition is similar to that of Anderson and Reeb (2003), Villalonga and Amit (2006), Miralles-Marcelo et al. (2014), and Vieira (2018). For it we have analyzed the names of the firms' owners and those of the members of the board of directors to avoid biased conclusions, as a classification of a firm detained by the government being classified as family firms.

To deal with macroeconomic fluctuation we have used the **GDP** annual growth as McNamara and Duncan (1995) and Vieira et al. (2019).

As control variables we include two types: firm' specific characteristics and corporate governance control. In the group of firm specific characteristics, liquidity, leverage, efficiency, firm' size and age ratios were included.

Liquidity (Liq) is measured as current assets divided by current liabilities (Fernandes, Peguinho, Vieira and Neiva, 2019, Vieira et al., 2019). Liquidity can increase firm's profitability if managers are efficient in managing these liquid assets (Deloof, 2003). Although higher liquidity increases agency problems between managers and shareholders (type I), since managers have more free cash flows to invest in resources which may increase its personal benefit instead of the firm's value (Fama and Jensen, 1983). Negative results of liquidity on firm's performance were found by Wang (2002) and Vieira et al. (2019).

Leverage (Lev) is the ratio of total debt divided by total assets (Miralles-Marcelo et al., 2014, Vieira et al., 2019, Martínez-Alonso et al., 2020). The impact of leverage on firm's performance is not consensual. While some researchers found that higher indebtedness causes a negative impact on performance, other found the opposite relationship. For one side, more indebt firms have less profits since part is used to pay financial costs. Moreover, these firms can have difficulties to access to new loans which can be needed to invest in new growth opportunities (Miralles-Marcelo et al., 2014, Martínez-Alonso et al., 2020). For another side, more leveraged firms have more financial resources which can be used to increase its activity and performance (Vieira et al., 2019, Martínez-Alonso et al., 2020). Jensen (1986)

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argues that debt works to monitor managers from opportunistic behaviors, which can help to explain the positive impact of leverage on firm's performance.

Asset turnover (AT) is a ratio of efficiency (total sales over total assets). It analyses the firm's ability in using its investments (total assets) to generate sales. The higher the ratio the greater the firms' efficient. Although it can also mean that the firm is near the maximum capacity (Fernandes et al., 2019).

Firm size, measured using the natural logarithm of total assets, is usually used to explain performance (Sacristán-Navarro, Gómez-Ansón and Cabeza-García, 2011, Miralles-Marcelo et al., 2014, Vieira et al., 2019, Aldamen et al., 2020, Martínez-Alonso et al., 2020). Larger firms benefit from economies of scale and can reduce production costs, increasing its profits. Moreover, smaller firms have more risk and uncertainties, which can damage its financial performance.

The firm's **age**, natural logarithm of the firm's year of working activity, is also considered as firm's performance determinants (Vieira, 2018, Aldamen et al., 2020, Martínez-Alonso et al., 2020). Older firms have more experience, knowledge, and ability to lead with unexpected situations which can enhance the firm's performance (Miralles-Marcelo et al., 2014).

In what concerns corporate governance variables, board size and the percentage of executive directors over total board members variables were included. The board of directors are responsible to monitor managers and to protect shareholders interests. Larger boards can easily control individual opportunism. **Board size** (BS) was measured as the natural logarithm of the board members (Vieira et al., 2019, Aldamen et al., 2020).

Finally, the number of **executive directors** (ED) on the board of directors is also taken into account. More executives can deal with new ideas due to brainstorming and to avoid individual opportunism. Although it can also create communication problems, delating some decisions which can damage the firm's performance.

Methodology

We use a panel data methodology to detect the impact on individual firms, and control for unexpected heterogeneity and biased results. The proposed model is the following:

$$\text{Performance}_{i,t} = c + \alpha_1 \times \text{Dfam}_{i,t} + \alpha_2 \times \text{GDP}_t + \alpha_p \times \sum \text{Firm's characteristics Variables}_{i,t} + \alpha_n \times \sum \text{Corporate governance Variables}_{i,t} + \mu_{i,t}$$

Where p the number of firm's specific characteristics variables ($p = 1, \dots, 5$), n the number of corporate governance variables ($n = 1, \dots, 3$); i is the firm analyzed and t the year study. $\mu_{i,t}$ is the error term.

We employ the system GMM (Generalized method of moments) estimation method for the dynamic panel data model. We applied the two-step estimations with equations in level. The Arellano-Bond for the first-order (AR(1)) and second order (AR(2)) serial correlation in the first-differenced residuals are used. The Sargan test is applied to validate the instruments. Finally, the Wald test is used to verify if the joint significance and the coefficients are significant distributes asymptotically.

RESULTS

Sample Characterization

Diverse researchers found that several listed firms are family type (e.g. Anderson and Reeb, 2003, Vilalonga and Amit, 2006, to the US market, Sraer and Thesmar, 2007, to France, Miralles-Marcelo et al., 2014 and Vieira, 2014, to Portugal, among others). In our sample, family firms are 57% of the total sample (21 firms), evidencing that family firms are in fact important in Portugal.

The following graphs show the evolution of performance proxies of family and non-family firms and the impact of GDP growth.

Figure 1. Evolution of accounting-based proxies of performance

With GDP: Gross domestic product; FF: family firms; NFF: non-family firms; ROA: return on assets; ROE: return on equity.

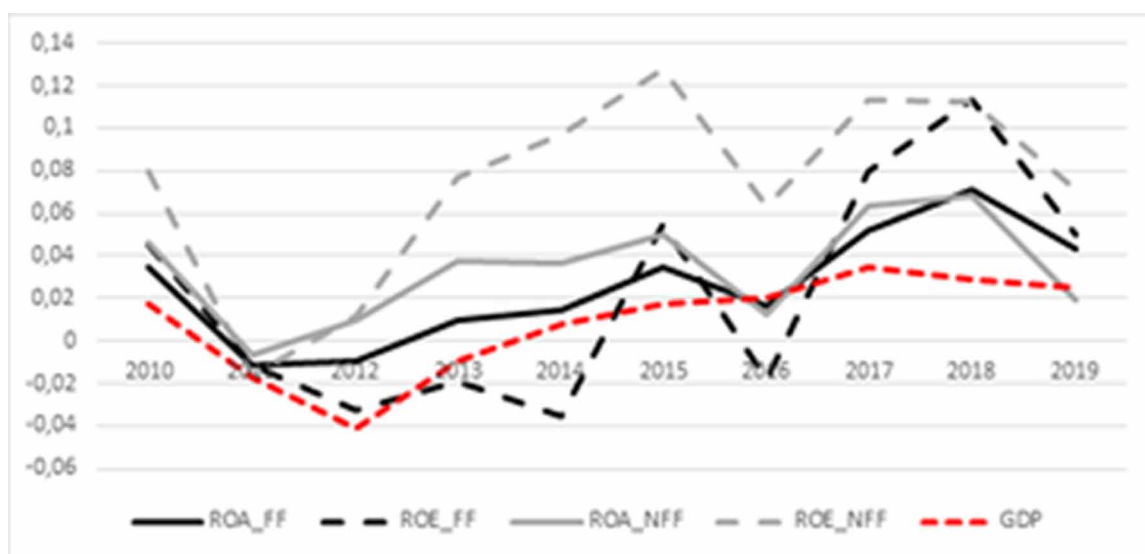


Figure 1 shows that non-family firms' profitability is, in mean, higher than that of family firms. Moreover, economic downturn impact firm's performance, specially to family firms as profitability ratios evolution follow GDP growth. In 2011 non-family firms' profitability increased, while to family firms it continued to decrease, following GDP growth.

Regarding market-value proxies of performance (figure 2), macroeconomic factors do not seem to affect it, since the ratios analyzed are more a less constant over the years and not followed the GDP growth. This fact suggests that market-based view of performance is less sensitive to macroeconomic conditions. Moreover, the differences between family and non-family firms (in mean) are not so evident compared to profitability ratios.

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Figure 2. Evolution of market-based proxies of performance

With GDP: Gross domestic product; FF: family firms; NFF: non-family firms; MTBV: market to book value; MVA: Market value added; TobinsQ: Tobin's Q.

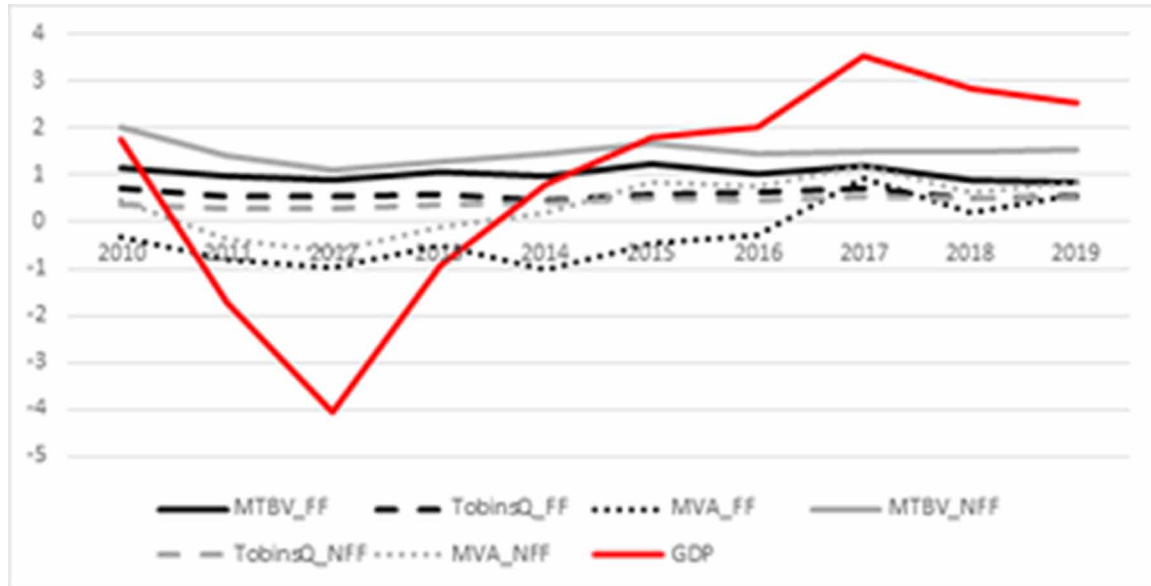


Table 1. Descriptive Statistics

	Mean	Median	Standard deviation	Minimum	Maximum
ROA	0.012	0.025	0.253	-2.912	1.600
ROE	0.019	0.049	0.426	-4.890	1.080
TQ	0.500	0.243	0.969	0.000	7.131
MTBV	1.174	0.760	1.488	-3.810	8.961
MVA	-2.070	-0.267	12.929	-119.102	13.733
DFAM	0.569	1.000	0.496	0.000	1.000
Liq	4.758	0.754	20.516	-1.297	215.074
Lev	0.474	0.460	0.344	0.001	2.517
AT	0.420	0.095	1.908	-14.401	13.213
Size	19.711	19.468	1.733	14.657	23.907
Age	3.529	3.664	0.701	0.693	5.273
GDP	0.851	1.765	2.252	-4.060	3.510
BS	2.052	2.079	0.532	0.693	3.135
ED	0.503	0.455	0.249	0.083	1.000

Age: ln(firm's age); AT: asset turnover; BS: ln(board size); DFam: dummy variable which is one if the firm is family type; ED: weight of executive directors over total members of the board; GDP: gross domestic product growth; Lev: leverage; Liq: Liquidity; MTBV: market to book value; MVA: market value added; ROA: return on assets; ROE: return on equity; Size: firm' size; TQ: Tobins' Q.

Source: Own source

Descriptive Statistics

Table 1 shows the descriptive statistics, namely mean, median, standard deviation, minimum and maximum of the variables in this study.

Table 1 evidences that, in mean, all proxies of performance present positive values (except MVA), but there is a great dispersion among the sample (standard deviation is high). This result suggests that some type of firms, years analyzed, or other factor can be relevant to explain the dispersion among the sample.

57% of the observations are from family firms, proving the relevance of this type of firms in the Portuguese market. In mean, firm's exhibit positive liquidity, it means, current assets are higher than current liabilities. Total assets are financed in 47% by liabilities (Leverage), suggesting that (in mean) firms are not do indebt, although there is a great dispersion among the sample. In mean, firms have 43 years old, so have experience and knowledge about the market and the activity. GDP growth was mainly positive in the sample. Only in 2011 till 2013 the GDP growth was negative, which were the years when contraction measures were applied in the country. Finally, the firms' board of directors have (in mean) 9 members, and executive directors represent about 50% of the total board members. These facts show that Portuguese firms present in mean small-size boards, and half of the members have executive positions in the firm.

In the next table (Table 2) the correlation matrix is presented.

Table 2. Correlation matrix

	ROA	ROE	TQ	MTBV	MVA	Liq	Lev	AT	Size	Age	DFAM	GDP	BS	ED
ROA	1													
ROE	0.356***	1												
TQ	0.144***	0.128**	1											
MTBV	0.152***	0.188***	0.753***	1										
MVA	0.054	0.048	0.245***	0.263***	1									
Liq	0.029	0.028	0.096	0.008	0.028	1								
Lev	-0.035	-0.013	-0.253***	-0.224***	-0.020	-0.207***	1							
AT	0.257***	-0.124**	-0.052	-0.094	-0.010	-0.033	0.062	1						
Size	0.094	0.156***	0.218***	0.269***	0.041	0.071	-0.157***	-0.180***	1					
Age	-0.032	-0.062	-0.001	-0.043	-0.144***	-0.113**	0.051	0.044	-0.045	1				
DFAM	0.051	-0.035	0.064	-0.178***	-0.166***	0.088	0.114**	0.123**	-0.023	0.190***	1			
GDP	0.007	0.075	0.053	0.052	0.098	0.098	0.004	-0.065	0.016	0.071	-0.020	1		
BS	0.021	0.118**	0.143**	0.226***	0.070	-0.268***	-0.055	-0.086	0.699***	-0.099	-0.117**	-0.048	1	
ED	0.057	0.010	-0.296***	-0.308***	-0.249***	0.198***	0.170**	0.206***	-0.477***	0.116**	0.199***	-0.034	-0.585***	1

Age: ln(firm's age); AT: asset turnover; BS: ln(board size); DFam: dummy variable which is one if the firm is family type; ED: weight of executive directors over total members of the board; GDP: gross domestic product growth; Lev: leverage; Liq: Liquidity; MTBV: market to book value; MVA: market value added; ROA: return on assets; ROE: return on equity; Size: ln(firm' size); TQ: Tobins' Q.

***, **, * level of significance of 1%; 5%; 10%, respectively.

Source: Own source

Analyzing table 2, results evidence that MTBV and TQ are high correlated, but these variables are alternative proxies of performance (both in a market-based view) not used in the same model. None of the other variables are highly correlated, at least not to a significant extend.

All performance variables are positively and statistically correlated, suggesting that can be used as alternative proxies, since vary in the same way. The dummy variable, that identifies family firms, is only

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statistically significant to explain MTBV and MVA, but in the opposite relation as expected (negative correlation). Results suggests that family firms decrease financial performance using these two proxies. This can be justified as family firms' information is less transparent, their shares are less liquid due to high family control, and the family may try to satisfy their own interests at the expense of minority investors wealth. Therefore, financial investors can be less aware to add additional value to family firms' shares.

Leverage is negatively correlated with performance measured by TQ and MTBV. More levered firms can have difficulties to invest in new projects since have surpass their maximum capacity of finance. Moreover, these firms have additional risk since part of the revenues is to pay financial costs. The firm' size and the board of directors' size contribute to increase firms' performance, not only because these firms can benefit from economies of scale, but also because larger boards can protect financial investors' interests. The weight of executive members on the board negatively influences market-based proxies of performance, since communication problems can appear, and decision-making can be delayed due to the difficulty to find a consensus among executive members. Finally, GDP growth does not seem to justify firms' performance.

To better understand family and non-family firms, in what they are similar and different, the next table compares the descriptive statistics of both groups. The Mann-Whitney Test (MW) nonparametric test was performed to test if the medians for both groups of companies are equal (the Kolmogorov-Smirnov analysis show that the data is not normally distributed).

Results presented in Table 3 suggest that family and non-family firms present similar financial performance measured by profitability ratios (ROA and ROE). Although, in a market-based view, non-family firms exhibit higher performance (TO, MTBV and MVA) compared to family firms (Mann-Withney test is significant), suggesting that financial investors add more value to non-family firms. This conclusion was also evident in the correlation matrix and can be explained since there is more information asymmetries with regards to family firms; families have more opportunities to expropriate firm's value due to emotional link between the family and the firm; and usually family firms' shares are more illiquid.

In what concern to the other variables, it can be observed that family and non-family firms are different with regards to age, board size and executive directors (MW results are statistically significant). Family firms are older than non-family ones, which goes in line with the idea that these firms are the older type of firms. Moreover, these firms have less members on the board of directors, but more executive members. Therefore, corporate governance characteristics are singular to both groups, calling the need to include these variables to explain firm's performance.

We also compare the descriptive statistics of downturn and upwards periods to understand the impact of macroeconomic factors on firms' financial situation (only financial ratios, with regards to firms' characteristics are analyzed). Results are presented in Table 4.

Table 4 shows that in downturns periods firms' financial performance is smaller than in upwards periods. Macroeconomic constrains reduce individuals and business consumptions, which limit the firms' activity. Therefore, firms' profitability is impacted, and the way financial investors perceive the firms' value also changes.

In recession periods, firms' liquidity decreases as well as its efficiency, due to the contraction of the economy. Finally, leverage and firm' size variables are not statistically significant impacted by macroeconomic factors.

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Table 3. Descriptive statistics by group of firms

Variable	Group	Mean	Median	Standard deviation	Minimum	Maximum	MW test
ROA	FF	0.023	0.016	0.172	-0.562	1.600	0.275
	NFF	-0.003	0.028	0.331	-2.912	0.570	
ROE	FF	0.006	0.043	0.453	-4.890	1.080	0.519
	NFF	0.036	0.069	0.388	-2.990	1.060	
TQ	FF	0.553	0.173	1.254	0.000	7.131	0.000
	NFF	0.429	0.359	0.310	0.005	1.251	
MTBV	FF	0.944	0.574	1.541	-3.810	8.817	0.000
	NFF	1.479	1.091	1.362	0.047	8.961	
MVA	FF	-3.939	-0.582	16.852	-119.102	13.733	0.000
	NFF	0.401	0.163	1.705	-2.049	7.175	
Liq	FF	6.327	0.624	26.537	-1.297	215.074	0.153
	NFF	2.684	0.921	6.428	0.001	56.421	
Lev	FF	0.508	0.448	0.411	0.001	2.517	0.510
	NFF	0.429	0.481	0.222	0.012	0.871	
AT	FF	0.624	0.095	2.484	-14.401	13.213	0.809
	NFF	0.150	0.096	0.434	-2.930	1.452	
Size	FF	19.676	19.775	1.804	14.657	22.397	0.109
	NFF	19.758	19.153	1.640	17.611	23.907	
Age	FF	3.645	3.784	0.501	2.398	4.585	0.000
	NFF	3.376	3.238	0.879	0.693	5.273	
BS	FF	1.998	2.079	0.558	0.693	3.045	0.058
	NFF	2.124	2.197	0.488	1.099	3.135	
ED	FF	0.546	0.500	0.283	0.083	1.000	0.009
	NFF	0.446	0.400	0.181	0.111	1.000	

With FF: family firms; NFF: non-family firms; MW: Mann-Whitney test.

Age: ln(firm's age); AT: asset turnover; BS: ln(board size); DFam: dummy variable which is one if the firm is family type; ED: weight of executive directors over total members of the board; GDP: gross domestic product growth; Lev: leverage; Liq: Liquidity; MTBV: market to book value; MVA: market value added; ROA: return on assets; ROE: return on equity; Size: ln(firm' size); TQ: Tobins' Q.

Source: Own source

Model Results

The results of the model's estimation using a two-step dynamic panel with equations at levels are presented in table 5.

Analyzing Table 5, the Sargan test has a p-value greater than 5% justifying that the instruments are valid; the Wald test has a p-value less than 5% meaning that the joint significance and the coefficients are significant distributes; AR(2) proves that there is no second-order correlation problem; AR(1) shows that the models are consistent and correctly specified by the variables used.

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Table 4. Descriptive statistics by economic cycle

Variable	Group	Mean	Median	Standard deviation	Minimum	Maximum	MW test
ROA	Downturns	0.014	0.005	0.196	-0.483	1.600	0.001
	Upwards	0.011	0.029	0.273	-2.912	0.570	
ROE	Downturns	-0.047	0.007	0.535	-4.890	0.464	0.000
	Upwards	0.046	0.068	0.371	-2.990	1.080	
TQ	Downturns	0.435	0.192	1.082	0.011	6.864	0.012
	Upwards	0.526	0.276	0.921	0.000	7.131	
MTBV	Downturns	1.056	0.636	1.496	-0.477	7.961	0.078
	Upwards	1.222	0.834	1.485	-3.810	8.961	
MVA	Downturns	-3.837	-0.564	17.063	-119.102	12.766	0.009
	Upwards	-1.361	-0.083	10.804	-77.697	13.733	
Liq	Downturns	1.258	0.521	2.473	-1.025	12.757	0.001
	Upwards	6.161	0.918	24.105	-1.297	215.074	
Lev	Downturns	0.469	0.418	0.358	0.037	2.517	0.621
	Upwards	0.475	0.477	0.339	0.001	2.452	
AT	Downturns	0.610	0.066	1.944	-0.702	12.498	0.045
	Upwards	0.344	0.103	1.892	-14.401	13.213	
Size	Downturns	19.663	19.160	1.694	15.647	23.767	0.560
	Upwards	19.730	19.512	1.752	14.657	23.907	

With Downturn: years with negative GDP growth, upward: the others; NFF: non-family firms; MW: Mann-Whitney test.

Age: ln(firm's age); AT: asset turnover; BS: ln(board size); DFam: dummy variable which is one if the firm is family type; ED: weight of executive directors over total members of the board; GDP: gross domestic product growth; Lev: leverage; Liq: Liquidity; MTBV: market to book value; MVA: market value added; ROA: return on assets; ROE: return on equity; Size: ln(firm' size); TQ: Tobins' Q.

Source: Own source

Findings show that previous performance is significant to explain the firm's actual performance. While prior profitability negatively impacts actual profitability, to market-based proxies of performance the impact is positive and statistically significant. This conclusion shows the relevance of using this methodology to capture this interaction between performance variables of different periods.

Regarding the variables included to explain performance, their significance and impact depends on the performance proxy used.

Family firms exhibit similar performance as non-family ones, except to MVA. Similar conclusions were found by Miralles-Marcelo et al. (2014) and Vieira (2014). This result suggests that to the Portuguese market, family and non-family firms present similar profitability, and financial investors do not distinguish both group of firms. Ntoug, Santos de Oliveira, Sousa, Pimentel (2020) argue that family firms are financial healthier compared to non-family firms, but our conclusions do not validate it.

In a univariate analysis (table 3) we show that family and non-family firms' profitability was similar. Although, in a market-based view (TQ, MTBV and MVA) the difference among both groups was statistically different. In a multivariate analysis (regression models) this difference is not validated, maybe because it is explained by firm's characteristic differences.

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Table 5. Results of the proposed model

	ROA	ROE	MTBV	TQ	MVA
c	-0.649 ***	-0.756 ***	-0.224	0.270 ***	4.773 ***
Performance(-1)	-0.066 ***	-0.137 ***	0.576 ***	0.995 ***	0.528 ***
DFAM	0.010	-0.003	-0.106	-0.015	-0.730 ***
Liq	-0.001 ***	-0.001	0.001	0.001 ***	0.010 ***
Lev	-0.050 ***	0.063 ***	-0.157 ***	-0.010	0.369
AT	0.047 ***	-0.054 ***	-0.009	0.001	0.015
Size	0.041 ***	0.035 ***	0.021	-0.031 ***	0.185 **
Age	-0.015 *	-0.026 **	0.023	-0.008 **	-0.649 ***
GDP	0.000	0.008 ***	0.013 ***	0.003 ***	-0.014
BS	-0.065 ***	0.037 **	0.149 **	0.151 ***	-1.561 ***
ED	0.082 ***	0.183 ***	-0.144	0.146 ***	-6.719 ***
Sargan	27.598	23.269	24.762	29.804	27.806
AR(1)	-1.208	-1.742 *	-2.141 **	-1.142	-1.245
AR(2)	0.557	-0.096	-0.186	-0.979	-1.077
Wald	483211 ***	46921 ***	6979. ***	0.000 ***	0.000 ***

Age: ln(firm's age); AT: asset turnover; BS: ln(board size); DFam: dummy variable which is one if the firm is family type; ED: weight of executive directors over total members of the board; GDP: gross domestic product growth; Lev: leverage; Liq: Liquidity; MTBV: market to book value; MVA: market value added; Performance (-1): previous year performance; ROA: return on assets; ROE: return on equity; Size: firm' size; TQ: Tobins' Q.

***, **, * level of significance of 1%; 5%; 10%, respectively.

To MVA, family firms present smaller performance than those of non-family ones. This result was also obtained to Cronqvist and Nilsson (2003) and Volpin (2002) which suggest that the family tends to misallocate resources, take some inefficient decisions and focus more on family interests than in the maximization of the firm's value. Moreover, this type of firms presents less information transparency, less liquidity regarding their shares and distribute less dividends to investors. Therefore, our first hypothesis is not validated to MVA proxy of performance.

In what concerns to firm's specific characteristics, liquidity negatively explains ROA, but has the opposite impact to TQ and MVA. Results suggest that an increase in liquidity leads to profitability decreases. When higher levels of liquidity exist, managers have additional free cash flow that can be used to increase personal at the expense of firm's value maximization. Although, more liquid firms present higher performance in a forecast perspective. Financial investors prefer to add value to more liquid firms since these firms are more efficient in managing liquid assets and have more opportunity to invest in new projects.

Higher indebtedness had a negative impact in performance proxies, namely ROA, ROE and MTBV. More indebt firms have more uncertainties and support higher financial costs. Therefore, these firms can have more difficulties to invest in new growth opportunities, which can damage the firm's value. This finding is consistent with those found by Miralles-Marcelo et al. (2014) and Martínez-Alonso et al. (2020). Assets turnover ratio, which is a proxy of the firm's efficiency, has a positive impact to ROA,

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but the opposite to ROE. Results suggest that as sales increase, the firm is more efficient in managing their total investment (ROA), but is not being efficient in increasing shareholders' return.

Larger firms exhibit greater performance, measured as ROA, ROE, and MVA, but the opposite sign to TQ. Larger firms can benefit from economies of scale and can reduce production costs, increasing its profits. This result supports the findings of Miralles-Marcelo et al. (2014), Vieira et al. (2019), Aldamen et al. (2020), Martínez-Alonso et al. (2020). Although, financial investors have less disposal to add additional value to larger firms since these firms can have difficulties to continue to growth. Contrary to our expectations, firm's age negatively explains ROA, ROE, TQ and MVA. In fact, older firms usually have more assets and total equity, being more difficult to generating profits. Moreover, these firms are usually in a maturity life cycle, with less growth opportunities.

Results show that an increase in GDP growth, namely upward periods, has a positive effect in firm's performance when measured by ROE, MTBV and TQ. During economic growths, customers purchasing power increases leading to higher firm's profitability and value added. This evidence supports hypothesis 2 and is consistent with results of McNamara and Duncan (1995), Issah and Antwi (2017) and Vieira et al. (2019).

Finally, regarding corporate governance variables, the board size impacts all proxies of performance, but has a positive impact to ROE and TQ, and a negative impact to the other proxies. If for one side more members on the board contributes to increase shareholders profits, for another side total assets are not so efficiently managed and financial investors do not seem it as a positive factor to the firm since more communication problems can appear. The weight of executive members on the board has a negative impact on MVA but a positive impact to ROA, ROE and TQ. Financial investors do not add additional value to firms with more executives, but more executives contribute to increase the firms' profitability, maybe due to new ideas and opportunities to sustain the firm's growth.

CONCLUSION

This chapter aims to analyze the impact of family control on firm's performance of Portuguese non-financial listed firms during the period of 2010-2019. Moreover, macroeconomic effect is also considered, as performance can be singular in downturn and upward periods.

Five different proxies of performance are considered: two accounting-based variables, namely ROA and ROE, and three market-based view of performance – MTBV, Tobins' Q and MVA. To explain performance, three group of variables are included: corporate governance variables, macroeconomic factors and firm' specific characteristics.

Results show that family and non-family firms exhibit the same performance, except to MVA where results prove that non-family firms outperform family ones. This can be explained since family firm shares are more illiquid, their information is less transparency, and this type of firms distributes less dividends to investors (DeAngelo and DeAngelo, 2000; Fahlenbrach, 2009).

Firms' performance is higher in upward periods and smaller in downturn periods. Although, when including GDP growth as one explanatory variable, results show that it only impacts ROE, MTBV and TQ, suggesting that the other difference in performance is explained by firm' specific characteristics. Moreover, firms' characteristics significance depends on the proxy of performance used. Finally, corporate governance characteristics also impact firm's performance, especially the board size.

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This research gives several contributions to stakeholders, especially managers, investors, regulators and banks. Managers can understand how they can deal with market fluctuations to avoid performance decreasing, especially during financial crisis; potential investors can understand which type of firms are more important to assure abnormal gains, and the impact of macroeconomic factors on it; regulators can reinforce the relevance of corporate governance practices; and banks can understand the impact of market fluctuations in firms' performance as well as which determinants are more relevant for each type of firm.

RECOMMENDATIONS AND FUTURE RESEARCH DIRECTIONS

The international financial crisis of 2007/2008, with great impact in Portugal from 2011 till 2014, have huge impact on firms' performance and survival. Although, with this crisis some lessons can be drawn to future crisis, as the impact of covid-19. In downturn periods firms must have liquidity to avoid increases in indebtedness and uncertainties. Moreover, firms must look for different ways to do business since increasing sales is needed to promote the firm's efficiency (assets turnover) and its profitability. This, in turn, will increase financial investors' expectations which will be more available to invest in these firms, increasing their market value and, therefore, MTBV, Tobins' Q and MVA.

For future it would be interesting to replicate this study to understand the impact of covid-19 on this relationship. Moreover, this work has analyzed a small-size country, with weak legal protection of investors and few information transparencies. Future studies should focus on other type of countries to understand if cultural differences impact results. Finally, the proportion of ownership in the hands of the major shareholder should also be taken into account since high levels of ownership concentration leads to more opportunistic behaviors of managers.

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KEY TERMS AND DEFINITIONS

Downturn Periods: Years when GDP growth is negative.

Family Firms: A company that is owned twenty five percent or more by a family, and there is a family member on the board of director to assure family control.

Female CEO: The CEO is a woman.

Gender Diversity: Diversity of gender (female and male) on the board of directors.

Performance in an Accounting-Based View: Profitability ratios, namely ROA and ROE, proxies of performance, which use only accounting data.

Performance in a Market-Based View: Proxies of performance, with a forecast perspective, that use market financial information (TQ, MTBV, MVA).

Chapter 14

Financial Analysis and Value Creation: A Case Study

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ABSTRACT

The business environment is increasingly complex and demanding, and companies now face a pandemic situation with severe repercussions for the global economy. With this in mind, it is clear that the information provided by financial analysis is more than ever an essential instrument for management control, for decision making. Value creation is considered one of management's primary objectives; however, there is still no consensus on the superiority of value-based measures over traditional measures based on profit. The study intends to highlight the importance of complementing the financial analysis, based on traditional valuation measures, using value creation as an essential management control instrument. Thus, using the case study methodology, an analysis of historical performance will be performed using data from a company listed on Euronext Lisbon from 2014 to 2018. Economic Value Added (EVA®) was used to measure value creation.

INTRODUCTION

Companies presently act in an increasingly complex and demanding business environment, now aggravated by the pandemic originated by Coronavirus Disease (COVID-19), with the first cases reported in December 2019 in Wuhan, China. The consequences for the global economy are yet unknown, but they will undoubtedly be severe.

In this scenario, the information provided by financial analysis is more than ever an essential instrument for management control for decision making. To better define and control strategies, companies need timely and quality financial information.

Modern finance theory considers one of the main objectives for any company to maximize its value creation (Assaf Neto, 2014). The fact that a company generates profitability in its business does not mean,

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that is, creating value since it may not be enough to pay off the entire invested capital. In assessing value creation, all of the costs are considered, including investors' return expectations. Therefore, including the assessment of value creation in the financial analysis reports allows for a better knowledge of the factors that affect this value creation to ensure the company's sustainability and attractiveness to investors.

Several studies have focused on the superiority of value-based measures over traditional measures based on profit, but the results are not consensual. The study's purpose was to show how value creation can act as a complement rather than a substitute for traditional performance measures.

To this end, The Navigator Company's historical business performance was analyzed from 2014 to 2018. The analysis focused on the company's ability to generate earnings, capital structure and management, cash flow, and value creation in an integrated way, thus providing a comprehensive view of the company's actual financial situation.

In the literature review, financial analysis and the concepts inherent to historical financial performance analysis were addressed, such as financial balance, profitability, risk, as well as value creation measured by the Economic Value Added (EVA®).

The study has its relevance by demonstrating how value creation can be an improvement to financial information when combined with traditional analysis. It provides knowledge on integrated financial analysis, thus providing crucial information to support decision making.

In terms of its structure, the study, in addition to this introduction, includes four more sections: literature review, methodology, empirical study, and conclusion.

LITERATURE REVIEW

Financial Analysis and Value Creation

Companies operate in a complex and demanding business environment, either due to globalization and technological innovation or due to the world's economic situation. Therefore, financial analysis, which is an integral part of the company's financial function, is increasingly important, by the information it provides to management, being an essential tool for decision-making, ensuring efficient management of the resources allocated to the organization.

The company's financial function has seen a constant evolution, having increasingly more tasks assigned to it. Consequently, the financial manager's role has changed, now having a more active role in the company's strategic decisions (Sá Silva, 2013). According to Neves (2012), in modern finance theory, management and financial function's objective became value creation for the shareholders, or preferably value creation. According to the same author, it is up to the financial analysis to apprise the fulfilment of the objectives assigned to the financial function and conclude whether the company has created value for its shareholders from a historical or forecasting perspective.

Financial analysis is also responsible for explaining the reasons for the creation or destruction of value. Thus, the financial analyst evaluates the company's financial equilibrium, profitability, risk conditions, and also its value creation.

Several studies such as those by Kumar and Sharma (2011), Bhasin (2013), Kruger and Petri (2014), Nakhaei (2016), and Nugroho, Hasan, and Warokka (2019) have focused on determining the superiority of value-based performance measures over traditional performance measures. However, the results are not consensual in their findings.

Several authors are now considering the use of value-based performance measures, focusing on EVA®, not as substitutes but as complements to traditional measures of business performance. It is the case of (Obaidat, 2019), which recommends using EVA® in conjunction with the traditional profit evaluation method. The author considers that these measures are not substitutes; on the contrary, EVA® should be used as an improvement of the information provided by traditional evaluation measures, thus becoming a powerful tool for evaluating business performance. Also, Sharma & Kumar (2012) argue that investors should use EVA® together with traditional accounting when making decisions. Teixeira (2016) also mentions the importance of complementing traditional financial analysis with value creation analysis, thus obtaining “a comprehensive overview of companies’ financial performance.”

Thus, the analysis of a company’s financial performance must be done with an integrated financial analysis, covering the analysis of profitability and business risk, financial position, cash flow, and value creation.

Financial Analysis

In order to make decisions on profit planning and budgeting, capital investment, mergers and acquisitions, and financing, managers need information about how the company is performing (Sherman, 2015). This information comes from financial analysis, thus being a crucial aspect of decision-making.

Financial analysis or business performance analysis is a process that uses a set of techniques to evaluate the economic and financial situation of a company through the financial information provided by accounting, identifying strengths and weaknesses of the firm’s financial situation (Kumara & Abhilasha, 2015). It uses financial statements like the balance sheet, income statement, and cash flow statement as base documents (Ganga, Kalaiselvan & Suriya, 2015; Neves, 2012).

Financial statements communicate financial information to both internal and external parties of the company. They are the financial reporting resulting from the operations processed in the accounting system. The company’s financial reporting provides information about its performance, financial position, and changes in the financial position.

The financial statement analysis uses this information combined with additional information to evaluate a given company’s past, current, and future performance potential (Robinson, Pirie & Broihahn, 2015). When conducted internally, it provides managers with important information that helps them make future business decisions based on historical performance. It can also be used externally to help investors decide which investment provides the best return (Sherman, 2015).

This analysis is performed considering the relationships developed by the company in the course of its activity, which can be analyzed from different points of view: financial, economic, and monetary, which in turn relate to the financial statements provided by accounting, taking into consideration the operations they are based upon. Associated to these perspectives and financial statements are essential concepts that co-relate and allow the study of the company’s financial health, considering its economic, financial, and cash flow situation as represented in figure 1.

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Figure 1. Integrated Financial Statement Analysis

Source: Adapted from Borges, Azevedo Rodrigues & Morgado (2002:34)

Financial Perspective	Economic Perspective	Cash Flow perspective
External financial flow	Internal financial flow	External financial flow
Balance Sheet Functional Balance Sheet	Income Statement	Cash Flow Statement
Working Capital Working Capital Requirement Net Treasury Liquidity and Solvency	Profitability Business Risk	Cash from Operating Activities Cash from Investing Activities Cash from Financing Activities Cash Flow Ratios
Financial Position	Profitability and Business Risk	Cash Flow



INTEGRATED ANALYSIS

In this model, the income statement is used to measure the company's profitability, it summarizes the revenues obtained and costs incurred (Wahlen, Baginski & Bradshaw, 2015).

The balance sheet is a statement of the financial position; it is a "snapshot" of the company's assets (resources), shareholder's equity, and liabilities (the financing of those resources) at a given period (Ross, Westerfiel, Jaffe & Roberts, 2015). It is used to assess the company's financial health.

The cash flow statement provides information about a company's sources and uses of cash over a period, divided into its three business activities: operating, investment, and financing (Wahlen et al., 2015).

Several methods and techniques that use the information provided by financial statements can be used in financial analysis like Ratios and indicators, Comparative Statement Analysis, Common Size Statement Analysis, and Trend Analysis. The combination of the various techniques allows for a more comprehensive analysis of the company (Pavithra, Thooyamari & Kermiki, 2017).

Ratios are an important technique used in financial analysis since they provide guidelines for assessing the company's performance and financial health; it is very helpful to compare within companies or industries. However, one of its limitations is the way the ratios are calculated; sometimes, authors use different perspectives does making it challenging to perform comparisons; therefore, the calculation formulas should always be presented.

In the financial literature, there are several approaches to analyzing financial performance. Many authors like Kumara and Abhilasha (2015) use ratios solely; the authors analyzed the Indian automobile companies using a set of profitability, liquidity, solvency, and efficiency ratios as financial performance parameters.

Pavithra et al. (2017) evaluated a cement company's financial performance using liquidity and profitability ratios and trend analysis of sales. Gheorghe (2013) performed an analysis focusing only on financial equilibrium. Myšková and Hájek (2017) analyzed the annual financial reports of U.S. firms from both points of view, a financial one based on a set of financial ratios and a linguistic one based on analyzing other information presented by firms in their annual reports.

An integrated financial statement analysis should provide ex-post information about the different areas, which are further explained below.

Profitability and Business Risk Analysis

According to Nabais and Nabais (2007), the economic analysis essentially consists of profitability and growth analysis as value creation factors. This analysis uses the income statement to evaluate profitability as well as economic viability and business risk.

In analyzing the economic situation, it is essential to assess the business's economic viability, that is, the ability of its operating activity to generate sufficient financial surpluses to absorb its operating expenses. To this end, one very important indicator is EBITDA (Earnings Before Interest Tax Depreciation and Amortization), which represents earnings before deducting interest expense, tax expense, depreciation & amortization expenses (Mota & Custódio, 2012)

EBITDA indicates the ability of the business to generate financial surpluses, that is, monetary flow. If systematically negative, it means that the operating activity is unable to meet the payments arising from that activity, and the company will consequently go into financial difficulties (Mota & Custódio, 2012). Therefore, for the company to be economically viable, it needs to have EBITDA positive values over the years since profit should come from operating activities.

According to Fernandes, Peguinho, Vieira e Neiva (2012), the profitability analysis's main objective is to assess a company's capacity to generate income through the efficient use of the means at its disposal (financial, material, and human). Profitability consists of a firm's ability to generate income above expenditure, i.e., to make a profit, and can be based on two perspectives: operating and strategic perspectives. The operating perspective is also called sales profitability and uses ratios that analyze the relationship between the income and sales of a company. From a strategic perspective, since profitability is affected by investment decisions, the analysis compares the company's capital invested with income.

The ratios selected for profitability analysis are (Fernandes et al., 2012; Neves, 2012):

Gross Margin Ratio (GMR) = Gross Margin / Net Sales

Operating Profit Margin Ratio (OPMR) = Net Operating Profit / Net Sales

Profit Margin Ratio (PMR) = Net Profit / Net Sales

Return on Equity (ROE) = Net Profit / Shareholders' Equity

Operating Return on Invested Capital (ORIC) = Net Operating Profit (EBIT) / Invested Capital

Return on Invested Capital (RIC) = Net Profit After Tax (without financial leverage) / Invested Capital

The Return on Equity (ROE) can be defined on the basis of ORIC, financial leverage, non-current results, and income tax effect, allowing an integrated analysis of the various activities that affect it. Thus the Return on Equity is computed from the operating Return on Invested Capital multiplied by the financial leverage index, which is a consequence of the indebtedness used by the firm and the weight that financial spending has in the result, furthermore, multiplied by the effect of non-current results and income tax effect, as illustrated in figure 2, allowing for a more detailed analysis of the factors conditioning its evolution (Neves, 2012).

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Figure 2. ROE detailed

Source: Adapted from Neves (2012:373)

Where: CM - Contribution Margin; S - Net Sales; OP - Operating Profit; IC - Invested Capital; E - Equity; NPBT - Net Profit Before Tax; CR - Current Result; NP - Net Profit

$$\text{ROE} = \underbrace{\frac{\text{CM}}{\text{S}}}_{\substack{\text{Gross} \\ \text{Margin} \\ \text{Ratio}}} \times \underbrace{\frac{\text{OP}}{\text{CM}}}_{\substack{\text{Fixed} \\ \text{Costs} \\ \text{Effect}}} \times \underbrace{\frac{\text{S}}{\text{IC}}}_{\substack{\text{Invested} \\ \text{Capital} \\ \text{Turnover}}} \times \underbrace{\frac{\text{IC}}{\text{E}}}_{\substack{\text{Capital} \\ \text{Structure}}} \times \underbrace{\frac{\text{CI}}{\text{OP}}}_{\substack{\text{Interest} \\ \text{Expenses} \\ \text{Effect}}} \times \underbrace{\frac{\text{NPBT}}{\text{CR}}}_{\substack{\text{Non-current} \\ \text{Results} \\ \text{Effect}}} \times \underbrace{\frac{\text{NP}}{\text{NPBT}}}_{\substack{\text{Income} \\ \text{Tax} \\ \text{Effect}}}$$

Operating Return on Invested Capital (ORIC)	Financial Leverage	Non-current Results Effect	Income Tax Effect
Operating	Financing	Non-current	Tax

Figure 2 shows the relationship between ROE, ORIC, and Leverage. It also shows the effect of Debt on ROE. This effect can be positive or negative, depending on between the ORIC and the Cost of Debt, and the weight of Debt in the Capital Structure. Indebtedness is not always an adverse characteristic; however, caution should be applied since although financial leverage can potentially benefit shareholders' return, it also increases the company's financial risk (Neves, 2012).

The income statement also provides essential information considering the type of costs it includes. Classifying costs according to their behavior based on the volume of activity is essential for decision-making. It is crucial for the company to know its variable and fixed costs, considering the risk of a very intense fixed costs structure.

Therefore, an income statement in variable costing, which includes fixed and variable expenses, should be a part of the company's business performance analysis.

A crucial analysis that can be performed using an income statement based on variable costing is business risk analysis. This analysis bases on quantifying the sensitivity of the results to variation of the items that contribute to its formation (Fernandes et al., 2012). According to the same authors, it reflects the probability that the operating profit is inadequate for the company's objectives; that is, the operating income is not sufficient to cover all operating expenses. Several factors impact on company's business risk like fixed and variable costs, selling prices, sales volume, and product mix and should be considered during decision making.

The ratios selected for business risk analysis, also called cost-volume-profit analysis, are (Fernandes et al., 2012; Neves, 2012):

Operating Break-Even Point (BEP) = Operating Fixed Costs (Fc) / Contribution Margin % (CM%)

Margin of Safety (MS%) = (Sales - Break-Even Point) / Sales x 100

Degree of Operating Leverage (DOL) = Contribution Margin / Net Operating Profit

This analysis indicates the risk of the business measured by the cost structure. The higher the fixed costs, the higher the business risk of the company. Therefore The higher the Operating Break-Even Point, the greater the company's operating risk since it needs to sell more to achieve a null operating profit, i.e., cover all its operating expenses (Fernandes et al., 2012).

The Degree of Operating Leverage (DOL) shows the percentage impact in operating profit compared to the percentage change in sales amount. Thus, the higher the DOL value, the greater the company's operating risk, as a change in its sales amount will have a more significant impact on operating profit (Fernandes et al., 2012).

Financial Position Analysis

Performance analysis from a financial perspective is essentially concerned with financial equilibrium and capital structure in the short and medium to long term.

This analysis can be performed following a more traditional approach through the use of balance sheet based ratios or following a functional approach through the study of financial equilibrium using the Net Treasury's notion, calculated on the functional balance sheet (Neves, 2012).

In financial analysis, the notion of financial equilibrium is used to check the financing's adequacy to the investment strategy and the management of the company's operating cycle. The notion of financial equilibrium refers to "the dominant concern of creditors and company management to be able at all times (short, medium and long term) to meet commitments on their due dates, in balance sheet analysis uses the notion of equilibrium between sources of financing and investments how stable the former and the destination of the latter (Neves, 2012, p.290)". Mota & Custódio (2012) also state that financial equilibrium is based on profitability since financial management alone cannot guarantee a company's financial equilibrium if it shows continuous losses.

In the functional approach, which is based on the functional balance sheet analysis, the financial equilibrium analysis uses the concepts of Net Treasury, Functional Working Capital, and Working Capital Requirements (Neves, 2012). In the functional balance sheet, assets are rearranged depending on their nature, according to the company's activity cycles: operating, investing, and financing (Gheorghe, 2013)

Functional Working Capital (FMF) is determined by the difference between permanent capital (stable resources determined by financing policy, the sum of equity with non-current liabilities) and adjusted fixed assets (investments resulting from investment decisions). Thus, when positive, Functional Working Capital represents the amount of stable financing intended to finance the operating cycle, indicating long-term financial equilibrium. If its value is negative, it means that part of the short-term financing is financing fixed assets, which indicates the financial structure's weakness and entails financial risks (Gheorghe, 2013).

Working Capital Requirement (WCR) represents the operating cycle's financing requirement and corresponds to cyclical needs subtracted with cyclical resources. When their value is positive, they indicate the operating cycle's financing needs and are said to be in deficit; on the contrary, when their value is negative, they indicate financial surpluses from the operating cycle, the cycle finances itself. The level of WCR "depends on the sector in which the company operates, the business' management practices, the technology used, the turnover, and the global management of the operating cycle. Therefore, they are a form of financial evaluation of operating management efforts" (Fernandes et al., 2012, p.94). WCR refers only to operating working capital and includes only operating components (such as accounts receivable, inventory, and accounts payable) (Palepu & Healy, 2013). The short-term financing components like cash, marketable securities, income tax, and non-operating payables are included in active and passive Treasury.

The Net Treasury (NT) is the difference between active (treasury assets) and passive (treasury liabilities) treasury, which is related to short-term financing. It can also be obtained by subtracting working

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capital requirements from functional working capital. Thus, in order to have financial equilibrium Net Treasury should be positive ($NT \geq 0$ or $FMF - WCR \geq 0$) (Fernandes et al., 2012).

The calculation of ratios can complement this analysis with information about the structure of applications and resources, the balance between the liquidity of applications and the enforceability of resources, and operational management (Mota & Custódio, 2012). The ratios selected are as follows (Fernandes et al., 2012; Neves, 2012):

Activity

Days Sales Outstanding (DSO) = Accounts Receivables / [Sales x (1 + VAT rate)] x Number of days

Days Payable Outstanding (DPO) = Accounts Payable / [(Purchases + External Supplies) x (1 + VAT rate)] x Number of days

Days Sales in Inventory (DSI) = Inventory / Cost of Goods Sold x Number of days

Liquidity

Current Ratio (CR) = Current Assets / Current Liabilities

Quick Ratio (QR) = (Current Assets – Inventory) / Current Liabilities

Financial Structure

Equity Ratio = Total Equity / Total Assets

Debt to Equity Ratio = Total Liabilities / Total Equity

Debt Ratio = Total Liabilities / (Total Equity + Liabilities)

Short-Term Debt Ratio = Current Liabilities / (Total Equity + Liabilities)

Long-Term Debt Ratio = Non-Current Liabilities / (Total Equity + Liabilities)

Financial Risk

Interest Coverage Ratio = EBITDA / Interest Expenses

Debt Payment Period = Total Debt / EBITDA

Degree of Financial Leverage (DFL) = Operating Income / Profit Before Taxes

Degree of Combined Leverage = Degree of Operating Leverage x Degree of Financial Leverage

Operational management, that is, management of the operating cycle is directly linked to a short-term management, and here it is appropriated to use activity ratios, covering management of operating credit granted and obtained and stock management (Mota & Custódio, 2012).

When analyzing short-term operations, another important concept is liquidity. Liquidity refers to the availability of cash to meet short-term operating needs. In other words, liquidity refers to the company's ability to convert its current assets into cash in order to pay current liabilities as they become due (Sumi, 2018).

The current ratio measures a firm's ability to pay off its short-term (within a year) liabilities with its short-term assets. For a company to show a favorable liquidity situation, the current ratio should be

one or higher since if all current assets are converted to cash they will generate enough funds to pay all current liabilities (Mota & Custódio, 2012).

Regardless, the degree of liquidity of current assets and the degree of resource requirement are not always the same. Thus it is possible to be in financial equilibrium with a Current Ratio of less than one, and the reverse is also true (Neves, 2012).

Another important aspect of analyzing a company's financial health is solvency and financial risk. It refers to the company's financing decisions. The solvency analysis allows ascertaining the company's ability to meet its long-term financial obligations.

As previously mentioned, financial leverage can benefit shareholders' equity return; however, it can also increase their risk. Financial debt has predefined payment terms that cause the risk of failure to meet these payments. Financial debt also has several potential benefits: it is usually cheaper than equity financing; in most countries, the cost of financial debt is tax-deductible, unlike dividends to shareholders, and promotes management discipline. Considering that financial debt can be beneficial but also risky, it is important to analyze the company's capital structure, the percentage of debt and equity (Palepu & Healy, 2013), and financial risk.

To ascertain how leveraged a company is with debt and financial risk involved, Mota & Custódio (2012) consider of great interest the use of Equity Ratio. This ratio ranges from zero to one and can also have a negative result when equity is negative. The higher its value, the lower the weight of creditors' capital, and the greater the company's independence from third parties (Fernandes et al., 2012). A low value of this ratio indicates significant dependence on creditors, which increases the company's financial risk and leads to greater difficulty in negotiating new financing and possible ongoing financing negotiations. A weak equity ratio causes intense pressure on managing cash flow (Mota & Custódio, 2012).

To quantify a company's financial risk, a commonly used ratio is the Degree of financial leverage. It measures the impact on net profit before taxes from changes in the operating income. The Degree of Combined Leverage (or Degree of Total Leverage) considers both the effects of Operating and financial risk; it refers to the company's total risk.

Cash Flow Analysis

The cash flow analysis is based on the cash flow statement. The aim here is to ascertain the firm's ability to generate and use cash flows in its various cycles of activity: operating, investment, and financing.

The fact that a company turns a profit does not necessarily mean that it has money, i.e., liquidity (Pinho & Tavares, 2012). According to Drucker, a company can survive without generating profits for several years as long as it has an adequate cash flow (liquidity); however, the opposite will not be feasible (Sá Silva & Martins, 2012), so it is essential to verify the ability to generate cash flows.

The cash flow statement provides useful information to complement the income statement; since it is prepared without considering the accrual accounting procedures, it reports only effective cash operations, sources, and uses of cash (Wahlen et al., 2015). Even profitable organizations sometimes have liquidity problems and are unable to pay creditors on time. The timing for cash inflows does not necessarily meet revenue recognition, and cash outflows do not necessarily meet expenses recognition due to accounting's accrual basis. Thus, a company might present a profitable activity showing positive net income for a period but present a negative net cash flow for the same period (Wahlen et al., 2015).

The cash flow is divided into sections for each of the activities, so the first step of cash flow analysis should be to examine the inflows and outflows from each activity.

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Cash flows from operating activities are cash flows from day-to-day operations. This section includes accounts receivable, accounts payable, and income taxes payable (Griffin, 2015).

Investing activities include operations related to long-term assets and other investments. In this section, outflows and inflows derive from the purchasing or selling of property, plant and equipment, intangible assets, and financial investments (long-term assets) (Robinson et al., 2015).

Financing Activities refer to the two primary sources of capital: debt and equity transactions. Cash inflows in this section include cash receipts from issuing stock or bonds and from obtained loans. Cash outflows include cash payments to repurchase stock, repay bonds and other loans, and dividend payments (Robinson et al., 2015).

This analysis can also be performed with ratios based on cash flow, which, according to Neves (2012), is an approach that has been followed by several authors as an alternative to using ratios based on the profit obtained on the income statement. According to the same author, the most commonly used ratios in cash flow analysis calculate as follows:

Cash Flow Debt Coverage Ratio = Cash Flow from Operations / (Total Debt + Interest)

Cash Flow Interest Coverage Ratio = Cash Flow from Operations / Total Interest

Cash Flow Investment Coverage Ratio = Cash Flow from Operations / Cash Paid for Investments

Sales Adequacy Ratio = Receivables / Net Sales

Cash Flow Interest Coverage Ratio = Cash Flow from Operations / Total Interest

Invested Capital Efficiency Ratio = Cash Flow from Operations / Total Invested Capital

Cash Flow Return on Equity Ratio = Cash Flow from Operations / Total Equity

These ratios are used: to measure the ability to generate sufficient cash flows to meet the commitments to financial institutions; to analyze deviations between results and cash flows caused by the accounting criteria of accrual, working capital requirements, and growth control; to assess whether the company can self-finance growth; and to highlight the ability to create cash flows (Neves, 2012).

Value Creation: Economic Value Added (EVA®)

“Business management has made significant advances in the way it operates, moving from a conventional posture of profit and profitability to a focus primarily on creating shareholder value (Assaf Neto, 2014, p.169).”

Thus, companies are currently focusing on creating value for their shareholders (Ganea, 2015; Kijewska, 2016; Sirbu, 2012), so value creation must be an important step in evaluating business performance.

A company creates value whenever its profitability is higher than the cost of the total capital invested. Thus, profit alone is not sufficient; it must be higher than the total return expectations for the investment made.

According to Assaf Neto (2014), a financial system organized around efficient management, which evaluates and discloses to the shareholders’ relevant information about the creation or destruction of value, is the essence of modern companies that operate in a competitive environment, which now require a more superior and sophisticated performance of accounting and corporate finance and a more dynamic performance of the financial manager.

There are currently several value-based valuation measures that can be used by companies, including Economic Value Added (EVA®), Market Value Added (MVA®), Refined Value Added (REVA), Cash

Value Added (CVA), Market equity to book value (MBV), Tobin Q-Ratio, Total Shareholders Return and Cash Flow Return on Investment (CFROI). So, management should decide which measure best suits its objectives.

Since the 1990s, EVA® has been a trademark developed and patented by Stern Stewart & Co. (Obaidat, 2019), at which time it gained prominence. EVA® is one of the based-value performance measures most widely used, both by companies and financial consultants for financial performance evaluation (Stancu, 2017). For this reason, a detailed analysis of (EVA®) is presented.

According to Sirbu (2012), EVA® is a simple method, widely disseminated both in business and academia, based on the idea that a company should create more profit than the return value required by investors (whether they are creditors or investors). EVA® differs from traditional valuation measures because it considers the cost of all the capital invested (both external and equity) (Obaidat, 2019).

For Stewart (1999), the value of EVA® represents the residual profit; in other words, the operating profit (after adjustments) less the cost of using the total invested capital. The author presents two formulas for its calculation, one using net operating profit after tax:

$$\text{EVA}^{\circledR} = \text{NOPAT} - (\text{IC} \times \text{C})$$

And, another, also called EVA® spread, using the operating return on invested capital:

$$\text{EVA}^{\circledR} = (\text{ORIC} - \text{C}) \times \text{IC}$$

Where: NOPAT - Net Operating Profit After Tax; C - The Cost of Capital; IC - Total Invested capital; ORIC – Operating Return on Invested Capital.

When interpreting the value obtained by applying the above formulas, a positive value of EVA® means value creation, a negative value implies value destruction, and a zero value means no value creation or destruction.

It is possible to deduct, from the above mentioned, that EVA®'s computation involves the following steps:

1. Analysis of the adjustments to be made to the accounting statements;
2. Calculate profitability (calculation of NOPAT or ORIC);
3. Obtaining the value of the Invested Capital;
4. Determine the Cost of Capital.

Stern Stewart & Co., the proprietors of the EVA® brand, recommend making 164 adjustments to the accounting statements before its calculation. These adjustments are intended to remove any distortions caused by applying accounting principles; however, given their high number, they have led several authors to criticize them, indicating that they make EVA® too complex and thus exceeding the benefit of its use (Obaidat, 2019).

According to Sharma & Kumar (2010), adjustments are the characteristic of EVA® that best distinguishes it and which has generated the most controversy; they are often criticized and considered to be of little importance. There is still no consensus on the merits of performing the adjustments. (Sirbu, 2012), considers that adjustments should be made differently, taking into account the company's type of business. Neves (2011) refers that although there are obviously exceptions, the outcome of adjust-

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ments will not be very relevant for most firms. Thus, the first step in calculating EVA® will be to decide which adjustments should be made, considering whether they are materially relevant, whether they affect shareholder value (Nagarajan, 2015; Neves, 2012).

Profitability can be obtained through Net Operating Profit from the income statement deducted from income tax or by calculating Operating Return on Invested Capital, also considering the income tax effect.

The invested capital corresponds to the investment made in the company (Neves, 2011). It corresponds to the sum of equity and financial debt resources invested in the activity (Assaf Neto, 2014; Young & O'Byrne, 2003) and must be obtained from the functional balance sheet.

To determine the cost of capital, usually, the weighted average cost of capital (WACC), is used which, according to (Rappaport, 2001) is the most appropriate method for calculating the cost of capital since it considers the return required by both debt and equity holders. The WACC corresponds to the sum of each capital component's cost multiplied by its proportional weight in the financing structure. It also incorporates the tax benefits arising from financial leverage concerning the deduction of interest for income tax purposes (Ganea, 2015).

Thus, to obtain the cost of capital, the WACC, it is necessary to start by calculating the costs of debt and equity. The cost of debt is the cost of financing the activity, which according to (Neves, 2012), will be the interest rate the company pays to financial institutions; however, when it is not possible to obtain it, it may be calculated using information obtained in the financial statements, by dividing interest expenses by the value of the financial debt.

The cost of equity represents the minimum rate of return required by equity investors and is an implicit cost, i.e., not a contractually established cost it must be estimated using appropriate methods (Ross et al., 2015)

While it is important to calculate EVA® to know whether or not value creation exists, this is not enough; a detailed analysis of the factors influencing it is also required (Kijewska, 2016).

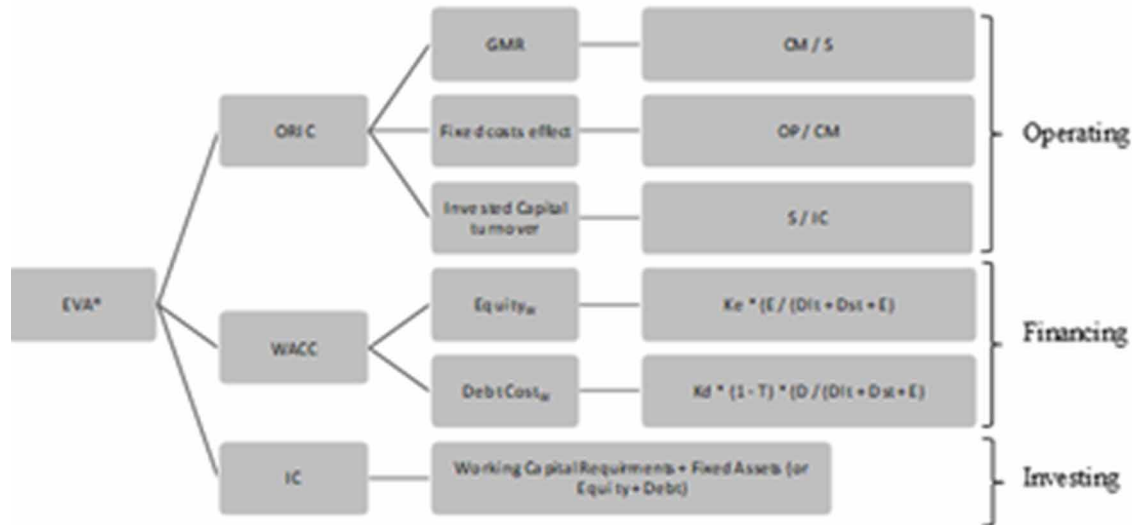
In addition to the quantification of value creation, it is also necessary to identify the variables that the company can control to allow management to take the measures needed to maximize value creation (MacDiarmid, Tholana & Musingwini, 2018), that is, direct its business strategies on the primary value drivers (Galvão, Teixeira & Nunes, 2018). Value drivers are variables that can be measured as valuation parameters that effectively influence the company's value creation (Assaf Neto, 2014; Rappaport, 2001). Thus, for management to be able to define its strategies focused on value creation, it must first have relevant financial information that allows it to assess the value creation of the company as well as the variables that contribute to it.

The calculation of EVA® allows us, through the decomposition of its calculation formula: $EVA^{\circledR} = (ROIC - WACC) * CI$, as shown in figure 3, to obtain a detailed analysis of the determining variables for its calculation, which cover the three cycles of the company's activity: operating, financing and investment. According to Assaf Neto (2014), value creation depends on combining strategies and decisions involving these three activities.

Figure 3. EVA® value driver tree

Source: own elaboration, adapted from <http://sternvaluemanagement.com>

Where: CM - Contribution Margin; S - Net Sales; OP - Operating Profit; IC - Invested Capital; E - Equity; D - Financial Debt; Ke - Cost of Equity rate; Kd - Cost of Debt rate; T - Income Tax Rate



Thus, it is possible to obtain information on the fundamental variables for maximizing value creation by performing a detailed analysis using the variables that contribute to the calculation of EVA®, similar to the analysis described for return on equity, which makes it possible to identify the factors with the most significant impact on value creation.

METHODOLOGY

The research is qualitative regarding the approach to the problem since it does not require the use of statistical methods and techniques (Prodanov & Freitas, 2013) and is descriptive and explanatory, considering its purpose. The literature review was based on bibliographic research. The empirical study focuses on case study methodology since its purpose is to study a phenomenon with depth. According to Gil (2008), the case study “consists of a deep and exhaustive study of one or a few objects, in a way that allows their broad and detailed knowledge” (p. 57). Furthermore, Yin (2003) considers it useful when the researcher has little control over the events studied.

The sample of the study is The Navigator Company, S.A., which was chosen due to its dimension and relevance in its activity sector of industrial materials, paper (from now on referred to only the “Group” or “Navigator”).

The period reviewed was five years, starting from the last year of financial statements available, at the time the study was performed, between 2014 and 2018.

The data necessary for the case study was collected from Navigator’s consolidated annual reports and accounts obtained from its official website, which, being a publicly-traded company, has its financial

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information publicly available. Data was also collected from the Bank of Portugal's online statistics and Professor Aswath Damodaran's website.

Purpose of the Study

The main purpose of the study is to highlight the importance of using value creation, measured by EVA®, in conjunction with traditional evaluation measures, used more often, acting as a complement rather than a substitute, thus constituting an essential financial analysis instrument. To this end, the aim of the study is to evaluate the historical financial performance of The Navigator Company, from 2014 to 2018, through an integrated financial analysis that includes the economic analysis, the financial position analysis, the cash flow analysis, and value creation analysis.

RESULTS

Background of the Company

The Navigator Company, S.A. is a publicly traded company based in Setúbal, listed on the Lisbon Stock Exchange (Euronext Lisbon), integrating its reference index, the PSI 20 (Portuguese Stock Index). The company's activity dates back to the 1950s, with the "Companhia Portuguesa de Celulose" in Cacia producing raw pine pulp.

Since then, it has been growing, being one of the key moments of its growth, the establishment of Portucel, in 1975, by merging several Portuguese pulp, paper, and packaging production factories. In February 2016, the Group changed its corporate brand to The Navigator Company, representing the union of companies with a history of more than 60 years, aiming to relay a more modern and appealing image (www.thenavigatorcompany).

Historical Business Performance Analysis

The Navigator's business performance was analyzed with ratios and comparative analysis, with an integrated financial statement analysis, using Excel, covering economic analysis, financial position, cash flow analysis, along with value creation analysis.

Since the three main financial statements are all linked and dependent on each other, an analysis can be performed by integrating related financial concepts. Net income is the final result shown in the income statement which links to the balance sheet and cash flow statement. On the balance sheet, it appears on the net result and retained earnings. The revenues and expenses in the income statement refer to collections and payments in the cash flow statement, and they also affect current assets and liabilities on the balance sheet. Net income increases Equity and improves solvency (Neves, 2012).

Financing activities impacts the three statements since the amount of debt influences the current and non-current liabilities on the balance sheet and is also included in the cash flow statement's financing activities. The interest expense related to financing appears on the income statement and cash flow statement. In the cash flow statement, the net cash from operations, investment, and financing activities is added to the beginning balance of cash and cash equivalents, and the result corresponds to the closing

balance of cash and cash equivalents in the balance sheet. Cash flows are a way to improve liquidity and meet financial obligations (Neves, 2012).

EVA® (value creation) is a function of profitability, invested capital, and cost of capital, so net income and financing activities also impact its value. Therefore, only the combined analysis offers a true insight into the company’s situation.

In order to have a more informed opinion about the company’s situation, it is helpful to perform a comparative analysis with the ratio values for the industry in which the company operates. Industry information was obtained from Banco de Portugal official website. The company’s ratios are compared with the mean values of ratios of all companies within the same industry.

Economic Analysis

The economic analysis determines Navigator’s ability to generate profitability and level of business risk. For this purpose, the income statement is the appropriate financial statement to be used since it shows the economic performance, analyzing the results, considering the aspects that condition them. The items of a financial and non-current nature included in operating results were reclassified to allow an accurate measure for each of the company’s activities: operating, financial, and non-current. Table 1 shows the adjusted income statement by nature.

Table 1. Income Statement by nature

Items	Thousands of Euros				
	Years				
	2014	2015	2016	2017	2018
Net sales	1 542 279	1 628 023	1 577 385	1 636 834	1 691 627
Other Operating Revenue	16 865	44 161	38 106	3 038	63 418
Total Operating Revenue	1 559 144	1 672 184	1 615 492	1 639 873	1 755 045
Total Operating Expenses	1 342 861	1 390 113	1 392 243	1 383 238	1 456 693
Net Operating Profit	216 283	282 072	223 248	256 635	298 352
Financing Result	-31 522	-47 231	-12 180	-3 913	-32 270
Current Profit	184 761	234 840	211 068	252 722	266 082
Non-Current Result	-637	-2 245	-1 505	-5 369	14 590
Net Profit Before Taxes	184 124	232 595	209 563	247 353	280 672
Income Tax Expenses	2 655	35 829	-7 266	39 584	55 535
Net Profit	181 469	196 767	216 830	207 769	225 137

Source: own elaboration

Table 2 refers to the variable costing income statement prepared for business risk analysis. This statement shows the contribution margin, which is obtained by deducting from the sales amount the value of variable expenses (Teixeira & Daniel, 2016), as well as the impact of fixed expenses on the activity. The expenses cost of goods sold and materials consumed, subcontracting, and goods transportation were considered to be of a variable nature in its preparation. As a matter of prudence, since the aim is

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to assess the business risk, in the absence of more information, all the other items of external supplies and services (SS) were considered to be of a fixed nature, as suggested by Neves (2012). Personnel costs have been considered as fixed costs, as well as depreciation and amortization, provisions, and other operating costs (Neves, 2012).

Table 2. Variable Costing Income Statement

Thousands of Euros					
Items	Years				
	2014	2015	2016	2017	2018
Net sales	1 542 279	1 628 023	1 577 385	1 636 834	1 691 627
Other Operating Revenue	16 865	44 161	38 106	3 038	63 418
Cost of Goods Sold	675 103	688 695	661 686	652 186	700 242
Other Operating Variable Costs	189 494	162 169	139 137	147 110	148 239
Contribution Margin	694 547	821 320	814 669	840 576	906 564
Fixed Operating Costs	478 264	539 249	591 421	583 942	608 212
Net Operating Profit	216 283	282 072	223 248	256 635	298 352

Source: own elaboration

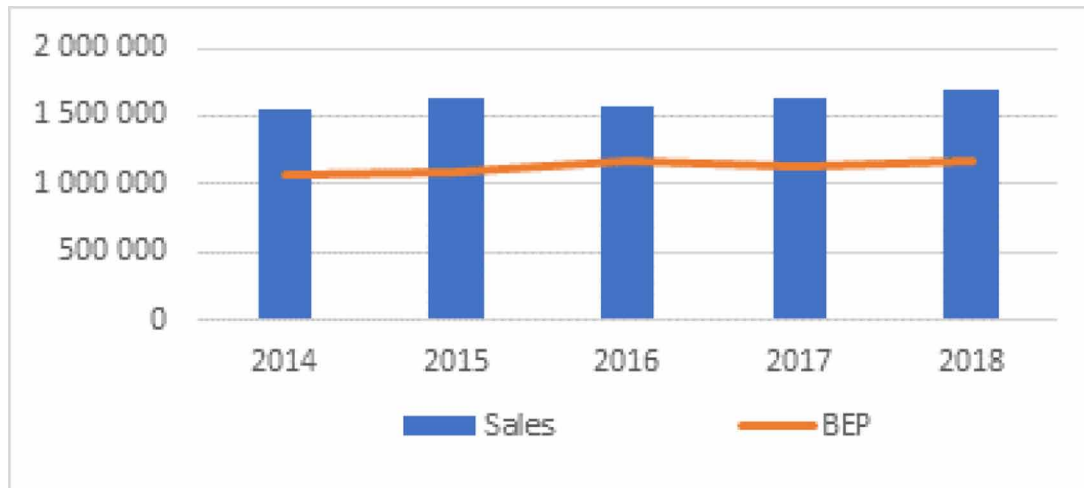
Table 3. Profitability and business risk ratios

	2014	2015	2016	2017	2018
Profitability					
Sales Growth	0,76%	5,56%	-3,11%	3,77%	3,35%
EBITDA (K €)	326 449	389 225	390 330	405 423	450 409
EBIT (K €)	216 283	282 072	223 248	256 635	298 352
Gross Margin Ratio (GMR)	45,03%	50,45%	51,65%	51,35%	53,59%
Operating Profit Margin Ratio (OPMR)	14,02%	17,33%	14,15%	15,68%	17,64%
Net Profit Margin Ratio (NPMR)	11,77%	12,09%	13,75%	12,69%	13,31%
Operating Return on Invested Capital (ORIC)	9,51%	13,50%	11,46%	12,96%	15,05%
Return on Invested Capital (RIC)	9,63%	11,68%	12,58%	11,24%	12,75%
Return on Equity (ROE)	12,48%	16,20%	17,58%	17,54%	18,97%
Operating Risk					
Operating Break-even Point (BEP)	1 073 624	1 097 895	1 172 789	1 139 207	1 177 456
Margin of Safety % (MS%)	30,39%	32,56%	25,65%	30,40%	30,40%
Degree of Operating Leverage	3,21	2,91	3,65	3,28	3,04

Source: own elaboration

Figure 4. Operating Break-even Point Analysis

Source: own elaboration



The business risk analysis requires information that the external analyst may be unable to obtain regarding variable and fixed costs; nevertheless, the external analyst's conclusions about cost-volume-profit analysis, although rough, are meaningful (Griffin, 2015).

By reading table 1, the income statement, we can conclude that the Group can generate earnings in its activity since it shows positive Net Profit and Operating Profit throughout the entire period. Its ability to generate profit has been improving since 2018, which is the year that the company shows the highest Operating Profit as well as Net Profit.

Table 3 shows the ratios calculated, as discussed in the literature review, to assess profitability and operating risk.

The company's main source of revenue is net sales. Sales Growth indicator shows that the company is in a growth phase. Only in 2016, Navigator's growth rate was negative, growing again in recent years, albeit to a lesser extent in 2018. The ideal situation is that sales growth generates an improvement in profit; it is the Navigator case. Its activity's growth is reflected in the capacity to generate surpluses since EBITDA shows that surpluses generated by operating activity are positive and have been increasing over the five years analyzed, indicating the Group's economic viability. The Group shows the capacity to self-finance its activity.

Regarding profitability ratios, there has been a positive trend in both sales profitability and invested capital. In 2018, Operating Profit Margin increased significantly, while Net Profit Margin, due to the increase in the weight of interest expenses, did not show such a significant increase. Operating Profit Margin increased at a higher level than the Gross Profit Margin, which can indicate an improvement in controlling operating fixed costs.

Return on Equity increases over the period; however, this increase does not result solely from the increase in net profitability, which increased its contribution but also from the reduction in Equity (in 2017, there is a reduction in the Groups' Social Capital). In general terms, a company can improve its ROE by increasing profitability or using financial leverage favorably. In this case, the financial leverage effect, indicating the contribution of debt to ROE, is positive and remains more or less the same through-

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out the period (only in 2014, the figure was below 1.4). The figures obtained, over the whole period, for Operating Return on Invested Capital are higher than the Cost of Debt, so an increase in debt will still benefit the Return on Equity, which may be the reason why the Group did not invest in self-financing, reducing the value of its Equity. However, the financial risk involved in increasing indebtedness must always be taken into account.

In terms of profitability, the company compares well with its industry. In 2018, it shows an Operating Profit Margin of 17.64% compared to the industry's mean value of 7.72%, indicating competitive advantage. Also, it has a higher percentage of Return on Equity Ratio of 18.97% compared with the industry's mean value of 16.01%. Therefore, the company is more profitable than its peers.

The business risk was analyzed by combining the BEP, the Margin of Safety, and the Degree of Operating Leverage, calculated based on data provided by variable costing income statement, from table 2, as explained in the literature review and shown in table 3.

Figure 4 shows how the Group's Operating Break-even Point evolution. This indicator's value is stable and under the net sales amount indicating that the company's sales are above BEP with a positive Margin of Safety of around 30%.

In 2018, the degree of operating leverage was 3.04, indicating that a variation of 1% in sales, considering everything else equal, will have an impact of 3.04% in operating profit. Compared to the industry with a DOL of only 0.74, the Group shows a higher business risk than other companies in the same industry.

Financial Position Analysis

The analysis of the financial position considered the financial equilibrium, capital structure, and financial risk. Financial equilibrium was analyzed using the Net Treasury following the functional approach. Therefore, it is based on functional balance sheet presented in table 4.

Table 4. Functional Balance Sheet (Net Treasury Perspective)

Thousands of Euros					
	2014	2015	2016	2017	2018
(1) Functional Working Capital (FWC) (2-3)	329 573	215 217	155 295	258 857	164 358
(2) Permanent Financing	1 922 121	1 900 834	1 871 829	1 852 732	1 838 643
(3) Fixed Assets	1 592 548	1 685 617	1 716 533	1 593 874	1 674 285
(4) Working Capital Requirements (WCR) (5-6)	155 922	234 859	230 742	220 267	260 717
(5) Cyclic Needs	440 472	483 867	492 397	495 643	607 274
(6) Cyclic Resources	284 550	249 008	261 654	275 376	346 556
(7) Net Treasury (NT) (8-9)	173 652	-19 642	-75 447	38 590	-96 360
(8) Treasury Assets	499 678	74 359	69 531	216 501	83 465
(9) Treasury Liabilities	326 027	94 001	144 977	177 911	179 825

Source: own elaboration

As shown in Table 4, the Group shows positive Functional Working Capital over the reviewed period, indicating that it finances all its fixed assets with recourse to permanent capital, which still releases a

safety margin to finance WCR, indicating long-term financial equilibrium over the entire period. However, this indicator has an unfavorable evolution, the Group increases its investment and decreases permanent capital, resulting in its decrease (in 2017, social capital was reduced). Working Capital Requirements are always positive, indicating that the Group’s operating cycle does not finance itself, which might indicate financial disequilibrium but requires the combined analysis of Net Treasury. WCR increase at the end of the period, albeit not significantly.

Net Treasury, which is the indicator of financial equilibrium, is only positive in 2014 and 2017, which, together with the other indicators, reflect a normal equilibrium position. However, in 2014, the high NT may indicate excess cash that has not been invested. In 2015, 2016, and 2018, Functional Working Capital is positive but insufficient to support the deficit working capital requirements, resulting in a negative Net Treasury. This situation indicates short-term financial disequilibrium since the Group needs financing to support its operating activities.

Regarding long-term financial equilibrium in 2018, Navigator compares well with the industry with a mean value of only 437th Euros (this might indicate that Navigator is a larger company than its peers). However, the industry’s Net Treasury is positive, indicating a favorable situation comparing to Navigator.

Operational management efficiency reflects on Working Capital Requirements, considering the adequacy of the assets’ liquidity to the liabilities’ enforceability, so it is also useful to look at activity and liquidity ratios as shown in table 5.

Table 5. Financial Position ratios

	2014	2015	2016	2017	2018
Activity and Liquidity Ratios					
Days Sales Outstanding (DSO)	35,49	32,69	34,24	32,41	35,23
Days Payable Outstanding (DPO)	40,86	38,09	39,64	42,01	37,22
Current Ratio (CR)	1,54	1,63	1,38	1,57	1,31
Quick Ratio (QR)	1,23	1,01	0,87	1,16	0,89
Solvency Ratios					
Equity Ratio (ER)	53,67%	49,97%	51,19%	48,58%	46,28%
Debt to equity Ratio (DTE)	86,31%	100,11%	95,34%	105,86%	116,06%
Debt Ratio (DR)	46,33%	50,03%	48,81%	51,42%	53,72%
Debt Ratio MLT	51,33%	71,78%	65,42%	63,86%	61,78%
Debt Ratio ST	48,67%	28,22%	34,58%	36,14%	38,22%
Financial Risk					
Degree of Financial Leverage (DFL)	1,17	1,21	1,07	1,04	1,06
Interest Coverage (IC)	8,61	6,98	14,32	23,12	13,16
Debt Payment Period (DPP)	2,39	1,88	1,84	2,03	1,71
Degree of Combined Leverage (DCL)	3,77	3,53	3,89	3,40	3,23

Source: own elaboration

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Table 6. Cash Flow Indicators and Ratios

	2014	2015	2016	2017	2018
Cash Flow from Operating Activities	342 375	353 426	302 574	374 692	393 253
Cash Flow from Investing Activities	22 287	180 687	76 747	98 863	134 901
Cash Flow from Financing Activities	-263 155	-520 162	-190 324	-139 206	-251 524
Net Change in Cash and Equivalents	-24 741	-426 895	-5 116	57 789	-44 471
Cash Flow Debt Coverage Ratio	0,42	0,45	0,41	0,45	0,49
Cash Flow Interest Coverage Ratio	9,03	6,34	11,10	21,37	11,49
Cash Flow Investment Coverage Ratio	15,36	1,96	3,94	3,79	2,92
Sales Adequacy Ratio	1,04	1,03	1,03	1,04	0,99
Invested Capital Efficiency Ratio	15,34%	18,16%	15,51%	18,66%	20,11%
Cash Flow Return on Equity Ratio	16,40%	7,68%	15,02%	16,63%	17,45%

Source: own elaboration

The Group has a DSO of around 30 days, meaning that it takes on average 30 days to collect accounts receivable. The ideal DSO is dependent on the type of business, but comparing with the industry's value of 44, the company shows a favorable situation. DPO is on average 40 days, meaning that it takes the company 40 days to pay credit accounts payable, compared with the industry means that requires 44 days. The above indicates a favorable situation: it collects money from customers before paying suppliers, creating an excess of cyclical resources. It also indicates that probably the inventories have considerable importance, thus originating positive Working Capital Requirements. Liquidity ratios may shed some light on this situation.

Regarding liquidity analysis, the Current Ratio has a value higher than one throughout the entire period, indicating that the Group has short term balance. Quick Ratio's analysis demonstrates the importance of inventories mentioned before, showing values much lower than the Current Ratio even below one in 2016 and 2018. Inventories are the less liquid current asset, indicating that the Group has some difficulty meeting its short-term commitments using only the operating cycle, as also indicated by Working Capital Requirements. The industry's mean indicates a more favorable position with a Current Ratio of 145.39% and a Quick Ratio of 130.51, showing less inventory significance.

Regarding solvency ratios, the Group has been reducing its Equity Ratio, thus increasing financial dependence from third parties, but still has a stable value compared to the industry's mean value, which is 39.62% in 2018, while the company finances 46.28% of its assets with Equity. This decrease is mainly due to the reduction in the Group's Equity over the period, with the reduction in capital and dividends distribution. The Debt-to-Equity Ratio and Debt Ratio have increased over the period, indicating greater indebtedness, also indicating financial dependence. The Group has favored medium and long-term liabilities, which, except for 2014, always represents more than 60% of total liabilities. The company's solvency has weakened over the period but not to the point of concern, transmitting confidence to its creditors.

Considering the financial risk, it is an organization that presents a low risk to its creditors. The Group is able to generate sufficient means to meet its financial expenses. The Group has also shortened the period necessary to pay the financial debt. The industry shows a DFL of 1.14, thus indicating higher financial risk than Navigator. However, the industry's DCL of 0,84 indicates lower total risk due to its much lower business risk.

Cash Flow Analysis

Cash Flow analysis uses the cash flow statement prepared for financial analysis. Given the use of accruals when preparing the income statement, it is also important to examine the company's cash flow. The main concern is whether Net Income translates to effective Cash Flow. The cash flow analysis was further complemented with the ratios shown in table 6.

The Group always generates positive Cash Flow from Operating Activities, indicating that the company can transform into cash flows the financial surpluses generated in the activity. It is able to generate liquidity, which is still sufficient to cope with non-current operations and investments. However, they are no longer sufficient to cover all the financing required, except for 2017, resulting in a negative cash change. The Financing Activities flow is negative due to a higher debt outflow than inflow showing debt repayment and dividend payment. The Group has favored dividend distribution over self-financing during the period, probably because it maintains a good Equity Ratio and has positive financial leverage. During the period Operating Cash Flow creation increased except for 2016, contributing to the company's solvency. However, cash and cash equivalents decrease at the end of the period, reflected in a negative Net Treasury that year.

The Sales Adequacy Ratio is above or close to one, indicating that the company has the ability to collect all its sales and therefore create cash flow. The coverage ratios indicate that the operating activity is able to cover interest expenses related to financing activities, the investment made during the period, but it only covers around 45% of total debt and its cost. Concerning profitability, both the return on invested capital and the return on equity indicates that the Group generates cash flows that allow it to remunerate the capital invested.

Value Creation

With the previous analysis, it was possible to determine that Navigator is a company with good profitability and cash flow generation potential; now, the question is if that profitability was enough to cover the firm's cost of total Invested Capital.

Value creation was measured with Economic Value Added (EVA®), which was calculated using its spread formula. It uses information from the income statement and balance sheet.

Regarding the adjustments proposed by the owners, it was decided not to make them since several authors believe that they have only a marginal value in the result, and considering them may make the calculation of EVA® too complex, as discussed in the literature review. Thus, it was necessary to obtain the Operating Return on Invested Capital (ORIC), the cost of capital (C), and Total Invested Capital (CI), that considered the following assumptions:

The Operating Return on Invested Capital (ORIC) is calculated in the economic analysis (table 4), adjusted with the income tax effect. The effective income tax rate (T), used for this purpose, results from the quotient between the value of Income Tax Expense and the Net Profit Before Tax (NPBT). In 2016, to avoid possible distortions in the results, since the tax is negative, a rate of 22.5% was considered, which results from the standard corporate income tax (IRC) rate of 21%, plus 1.5% municipal surcharge (www.pwc.pt).

Total Invested Capital refers to capital employed, the company's total assets plus working capital requirement or equity plus non-current financing. Since it considers data from a static financial statement, the balance sheet is adjusted by calculating the beginning and ending period's simple mean value.

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Table 7. Economic Value Added (EVA®)

EVA®		2014	2015	2016	2017	2018
Operating Return on Invested Capital (ORIC)						
(1)	ORIC x (1 - T)	0,09	0,11	0,09	0,11	0,12
Invest Capital (IC)						
(2)	Financial Debt - D ((Di - Df)/2)	806 519	755 339	724 775	770 643	796 099
(3)	Equity - E ((Ei - Ef)/2)	1 466 744	1 333 963	1 223 766	1 209 075	1 185 749
(4)	CI = D + E = (2 + 3)	2 273 263	2 089 302	1 948 542	1 979 718	1 981 848
Cost of Equity rate (Ke)						
(5)	Risk-free rate - Rf	3,80	2,40	3,20	3,10	1,80
(6)	Market Risk Premium - (Rm - Rf)	8,25	9,05	9,24	7,64	9,02
(7)	beta	1,23	1,18	1,12	1,00	1,15
(8)	Ke = (5 + 6 * 7)	13,95	13,05	13,52	10,71	12,17
Cost of Debt rate (Kd)						
(9)	Interest Expenses	31 638	29 618	13 987	10 374	7 872
(10)	Kd = (9 / 2)	0,039	0,039	0,019	0,013	0,010
(11)	Income Tax rate	0,014	0,154	0,225	0,160	0,198
Weighted average cost of capital (WACC)						
(12)	WACC = [8 x (3 / 4)] + [10 x (1 - T) x (2 / 4)]	0,104	0,095	0,090	0,070	0,076
EVA® = (ORIC - WACC) x IC		-22 685	39 466	-3 254	77 301	88 663

Source: own elaboration

The cost of capital was obtained through the weighted average cost of capital (WACC), which is calculated by weighting the financing sources' costs with their relative weight in the financing structure (Damodaran, 2001; Assaf Neto, 2014).

The Cost of Equity, necessary to calculate WACC, was estimated according to the CAPM model since the company studied is a publicly traded company, which according to (Carvalho & Barajas, 2012), is one of the models most used when estimating the return required by shareholders. The calculation is as follows:

$$\text{Cost of Equity (Ke)} = R_f + \text{Beta} \times (R_m - R_f)$$

in which:

R_f – Risk-free rate - the annual average of the monthly yields on Portuguese Treasury Bonds with a 10-year maturity, obtained in Banco de Portugal online statistics, which according to (Carvalho & Barajas, 2012) and (Neves, 2012), are usually those used as risk-free assets, whose values are shown in table 7.

$(R_m - R_f)$ - Market Risk Premium. The market risk premium, which corresponds to the difference between the return on the market portfolio (R_m) and the rate of return on risk-free investments (R_f)

(Assaf Neto, 2014), considers the value calculated by Professor Aswath Damodaran for Portugal, obtained from his website (<http://people.stern.nyu.edu/adamodar/>), as shown in table 7.

Beta - The Beta used is the value presented by Professor Aswath Damodaran for the European mean value of the company’s activity sector (<http://people.stern.nyu.edu/adamodar/>), which is shown in table 7.

The Cost of Financial Debt (Kd) was calculated by dividing the interest expenses obtained in the income statement by the total value of the financial debt, shown in the company’s balance sheet.

The values obtained for EVA® in the period analyzed, considering the assumptions made, are shown in table 7.

Navigator is able to generate operating profitability from its business over the entire period. However, in the years 2014 and 2016, the profit generated was insufficient to support all financing costs, considering the assumptions made. In the remaining years, the Group shows an operating return on Invested Capital higher than the cost of capital, so it has created value, which increases at the end of the period, making 2018 the year with the higher EVA® value.

As mentioned before, while it is crucial to calculate EVA® to determine if the company is creating value, this is not enough; a detailed analysis of its value drivers is also mandatory, so table 8 reflects the EVA® value driver tree.

Table 8. EVA® value driver tree

	2014	2015	2016	2017	2018
EVA® = (ORIC - WACC) x IC [(1 - 6) x 11]	-22 685	39 466	-3 254	77 301	88 663
(1) Operating - ORIC (2 x 3 x 4 x 5)	0,09	0,11	0,09	0,11	0,12
(2) Gross Margin Ratio	0,45	0,50	0,52	0,51	0,54
(3) Fixed Costs Effect	0,31	0,34	0,27	0,31	0,33
(4) Invested Capital Turnover	0,68	0,78	0,81	0,83	0,85
(5) (1-T)	0,986	0,846	0,775	0,840	0,802
(6) Financing - WACC (7 x 5 x 9) + (8 x 12)	0,104	0,095	0,090	0,070	0,076
(7) Cost of Debt Rate (Kd)	0,039	0,039	0,019	0,013	0,010
(8) Cost of Equity Rate (Ke)	0,140	0,131	0,135	0,107	0,122
(9) Debt Proportional Weight (PD) (D/(D+E))	0,355	0,362	0,372	0,389	0,402
(10) Equity Proportional Weight (PE) (E/(D+E))	0,645	0,638	0,628	0,611	0,598
(11) Investing - Invested Capital (14 + 15) ou (D+E)	2 273 263	2 089 302	1 948 542	1 979 718	1 981 848
(12) Working Capital Requirements (WCR)	655 124	450 220	247 467	324 514	347 768
(13) Fixed Assets (FA)	1 618 139	1 639 082	1 701 075	1 655 204	1 634 080

Source: own elaboration

This analysis combines indicators from traditional financial performance analysis with EVA® analysis. Therefore, the value creation performance measure used (EVA®) acts as a complement to traditional analysis, not as a substitute, with both approaches providing critical information for decision making.

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In the case of Navigator, operating profitability was one of the main factors that contributed to value creation. The increase in profitability in 2018 was due to the increase in Gross Margin Ratio, the decrease in the weight of fixed expenses, and an improvement in the capital invested efficiency, showing better control management of the operating activity. Another important factor in the Group's value creation was the reduction in the cost of capital. The cost of financial debt capital has fallen significantly over the period, which may have resulted from a more favorable economic climate. Over the period, there is also an increase in the weight of financial debt, consequently, a decrease in the weight of equity, which has higher cost than financial debt. The cost of equity is a variable with considerable weight in the value of EVA®, since it usually has a higher cost than debt, and in the case of the Navigator Group, equity has a considerable weight in the financing structure, representing over the period values around 60%. The invested capital in 2014 was higher than in 2018; thus, a decrease in invested capital is also favoring value creation at the end of the period.

Regarding value creation, the main issue has been whether value-based performance measures replace traditional profit-based performance measures, given their superiority. However, several authors, such as Obaidat (2019), Teixeira (2016), and Sharma & Kumar (2012), have been demonstrating the importance of value creation analysis not as a substitute but as a complement to traditional analysis, both providing vital information.

Value creation analysis provides essential information for decision making, as it complements the company's financial health situation analysis. The fact that the company is profitable does not always mean creating value for its shareholders, that is, adequately remunerating them according to their expectations. This analysis can be further enriched by the detailed analysis of the factors that contribute to value creation through indicators found in traditional financial performance analysis. This makes it possible not only to assess the company's value creation capacity but also to identify, more precisely, areas of intervention to improve this capacity.

CONCLUSION

Value creation is considered one of management's main objectives, so it should be a crucial aspect of financial information. Although the main question has been the superiority of value-based measures over traditional measures based on profit, several authors are now considering the use of value-based evaluation measures, focusing on Economic Value Added (EVA®), not as substitutes, but as complements to traditional measures. Authors like Obaidat (2019) recommend using EVA® in conjunction with the traditional method of evaluation based only on profit. Therefore EVA® should be used not as a substitute but as an improvement of the information provided by the traditional evaluation measures.

The study aimed to highlight the importance of complementing the financial analysis, based on traditional valuation measures, with the analysis of value creation as an important management control instrument. To this end, using the case study methodology, an analysis of the evolution of Navigator's historical business performance was performed in an integrated approach to the economic, financial, cash flow, and value creation capacity during the period from 2014 to 2018.

Value creation was measured with EVA®, which, although not a recent concept, remains unequivocally one of the most widely accepted and used value-based performance measures, which has gained popularity not only as a measure of economic-financial performance but also as a strategic management instrument (Pletsch, Reif & Da Silva, 2015; Sabol & Sverer, 2017).

The analysis performed about Navigator led to the conclusion that it had an economic and financial positive evolution. The Group is economically viable and has increased its profitability both in terms of sales and invested capital, thus contributing to its solvency. It shows a good capacity to transform profit into cash flow. It is an organization with low financial risk, with a good Equity Ratio, showing strong independence from creditors. Concerning value creation, although it generated positive returns over the whole period, this has not always been sufficient to support the cost with the total invested capital invested, considering the assumptions made. The year 2018, the last year analyzed, was the one in which the Group showed the greatest capacity to create value.

The detailed analysis of EVA® revealed that the increase in profitability, the decrease in the cost of financial debt, and the decrease in the weight of equity (the most costly source of financing) were the variables that contributed most to the improvement in the capacity to create value seen at the end of the period.

The study has shown how value creation can be important when used in financial analysis, combined with traditional and more frequently used financial analysis techniques. Value creation analysis should not be seen as a replacement for traditional analysis based on profit, as advocated in several studies, but rather as a complement, providing a more comprehensive view of an organization's true measure of financial performance.

The study had as a limitation the fact that it only considered publicly available data from the studied company, not allowing a more detailed analysis.

In terms of future research direction, it is considered important to perform the study using a smaller company to assess the difficulties in obtaining the financial information needed to include value creation in the historical business performance analysis.

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Chapter 15

Central European Banking Sector Integration and Shocks During the Global Pandemic (COVID–19)

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ABSTRACT

This chapter aims to analyze the impact of the global 2020 pandemic on the banking sectors of the Czech Republic, Hungary, Poland, Romania, Russia, and Slovakia countries in the period from January 2, 2017 to August 10, 2020. The results of the Gregory-Hansen test, in the covid subperiod, show 27 integrations (in 30 possible). When comparing the pre-covid and covid subperiods, the level of integration has increased 386% between markets, which could call into question portfolio diversification, validating the first research question. In corroboration, the authors have verified that the results of Granger's causality tests, in the COVID-19 subperiod, increased significantly. In view of these results and bearing in mind the results of integration, they can show that the crisis caused by the global pandemic of 2020 has increased the synchronization between these regional banking sectors, significantly decreasing the hypothesis of implementing efficient portfolio diversification, thus validating the second research question.

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INTRODUCTION

The Covid-19 pandemic adversely affected global trade, as well as social and cultural life, including tourism, trade in goods, production and sectors such as transport. The rapid spread of coronavirus (Covid-19) has dramatic impacts on financial markets around the world, causing significant losses for investors in a very short period of time. In line with all these negative effects, it seems inevitable that economic growth and financial markets have also been affected in the same way (Ashraf, 2020; Bakar and Rosbi, 2020; Ceylan, 2020; Khan, 2020; Kupferschmidt and Cohen, 2020).

The growing trend of integration in international financial markets has increased the likelihood of risk transmission between markets. In times of turmoil, investors should balance their portfolios by closing long positions in markets with significant levels of risk. (Dias, da Silva, and Dionisio, 2019; Mohamadpoor and Rezazadeh, 2019; Morales and Gassie, 2014).

According to the authors Belke, Beckmann, and Kühl (2011) despite the many similarities between the stock markets of Central and Eastern European Countries (CEEC), there are important differences in terms of market size, level of development, among other. The characteristics of the stock market may explain the differences between the global and regional integration of CEEC stock exchanges. The authors Tilfani, Ferreira, and El Boukfaoui (2020) show that the stock markets of Czech Republic, Hungary, Croatia, Poland and Romania are more integrated, while the stock exchanges of Bosnia, Montenegro, Serbia and Slovakia are less integrated. In addition, the authors show that during crises, levels of integration increased.

This chapter intends to analyze the impact of the global pandemic of 2020 on the banking sectors of Czech Republic, Poland, Romania, Russia and Slovakia, in the period from January 2, 2017 to August 10, 2020. The results show that the global pandemic of 2020 has exponentially increased integration into central European banking sectors, thus validating the first research objective. In addition, we note that increased integration also increases market shocks, particularly in the Covid sub-period, thereby validating our second research question. In view of these results, we show that the global pandemic has a very significant impact on the memory properties of these banking sectors, to the point of significantly reducing the hypothesis of portfolio diversification.

In terms of structure this chapter is organized in 5 sections. Section 1 is represented by the current introduction. Section 2 presents a Literature Review with regard to articles on integration in the banking sectors. Section 3 describes the data and methodology. Section 4 contains the results. Finally, section 5 presents the general conclusions of the work.

LITERATURE REVIEW

Understanding the international links between stock markets and investigating the occurrence of financial integration phenomena in the context of stock market crash is important for investors, investment fund managers and academics on several levels, including the diversification of portfolios in an international context (Dias, da Silva, and Dionísio, 2019; Dias, Heliodoro, Teixeira, and Godinho, 2020).

Horvath and Petrovski (2013), Rughoo and Sarantis (2014), Orłowski and Tsibulina (2014) examined the integration of the financial markets and the banking sectors of Europe. Horvath and Petrovski (2013) show that the integration into the markets of the Czech Republic, Hungary, Poland, Croatia, Macedonia and Serbia suffer a strong fall at the beginning of the global financial crisis, but the degree of integration

of the stock exchanges into analysis did not change with the 2008 crisis. Rughoo and Sarantis (2014) examined the impact of the 2008 global financial crisis on the process of integrating the European banking sector. The authors show that the global crisis has negatively affected the banking integration process. Orłowski and Tsioulina (2014) studied the integration of financial markets and the banking sectors of Central, Eastern Europe and the Euro zone, assuming that financial integration is essential for monetary convergence. The authors show that the banking sectors of Czech Republic and Poland show greater integration when compared to the sectors of Slovakia and Slovenia, while Hungary's banking sector shows the lowest level of integration.

Nițoi and Pochea (2016), Mensah and Premaratne (2016), Mensah and Premaratne (2017), Mensah and Premaratne (2018) examined the integration between several types of financial markets in various regions. Nițoi and Pochea (2016) analyzed financial convergence between stock markets, sovereign CDS, long-term government bonds and the central and eastern European banking sector (CEEC). The authors show that the EEC's financial markets do not form a homogeneous convergence. Moreover, in the aftermath of the global financial crisis and the sovereign debt crisis, disparities between these financial markets increased. The CEEC should implement new structural reforms in order to achieve greater financial convergence. The authors Mensah and Premaratne (2016) show that total integration did not occur in the banking sector in the ASEAN region, as well as in other Asian markets. Mensah and Premaratne (2017) show that integration between the banking sectors of developed Asian markets is higher when compared to emerging markets. The authors find evidence of asymmetric dependence, suggesting that comovements fluctuate when markets are up or down. Mensah and Premaratne (2018) examined financial integration in the stock indexes of the banking sectors of Singapore, Malaysia, Thailand, the Philippines, Indonesia, Japan, Hong Kong, China, India and the U. The authors highlight causalities between Singapore, the ASEAN markets and the US.

Balcerzak, Klietnik, Streimikiene, and Smrčka (2017), Grmanová and Ivanová (2018), Aloui, Shahzad, and Jammazi (2018), Ferreira, Dionísio, Guedes and Zebende (2018), González, Razia, Búa, and Sestayo (2019) analyzed the predictability of the shares of the banking sectors of Europe and the MENA countries. Balcerzak, Klietnik, Streimikiene and Smrčka (2017) show that there are differences between the efficiency of the banking sectors of the "old" fifteen and the "new" EU member countries. In corroboration, they show that there is a clear difference, between the efficiency of the banking sectors that are members of the European Monetary Union, and those outside the Euro Zone. Grmanová and Ivanová (2018) show that the three largest Slovak banks are efficient, in their weak form. Aloui, Shahzad, and Jammazi (2018) examined the hypothesis of market efficiency in 22 banking sectors in Europe. The authors show that all sectors of the euro area credit market are multifractal, i.e., show the presence of long memory in the short and long term. In addition, market efficiency levels vary over time for both short and long-term horizons, and change significantly in crisis and non-crisis scenarios. Ferreira, Dionísio, Guedes, and Zebende (2018) argue that the financial crises of 2008 and 2010 affected European markets in general, especially the banking sector. They also show that the 63 European banks (inside and outside the Euro Zone) analysed significantly decreased their market efficiency. González et al. (2019) analyzed 201 banks in the Middle East and North African countries (MENA) during the period 2005–2012. The authors show that the hypothesis of efficiency in the banking sector is rejected in MENA countries.

Exploring the recent period of crisis due to the global pandemic, this work aims to contribute to provide better information for investors and regulators in central European markets, where individual and institutional investors seek to efficiently diversify their portfolios, in a period of uncertainty and lack of confidence.

DATA AND METHODOLOGY

The data used for the preparation of the test were the prices index (daily) of the banking sectors of Czech Republic, Poland, Romania, Russia and Slovakia in the period from January 2, 2017 to August 10, 2020. The sample was partitioned into two subperiods: first subperiod from January 2, 2017 to August 30, 2019 (Pre-Covid); second period from September 2, 2019 to August 10, 2020 (Covid-19). The source for obtaining information was the Thomson *Reuters* platform, where data was extracted in local currency in order to mitigate distortions in exchange rates (see Table 1).

Table 1. Sample: Countries and bank sectors

Indices	Country
CZECH REP. DS Banks	CZECH REP.
HUNGARY DS Banks	HUNGARY
POLAND DS Banks	POLAND
ROMANIA DS Banks	ROMANIA
RUSSIA DS Banks	RUSSIA
SLOVAKIA DS Banks	SLOVAKIA

Source: Own elaboration

As for the econometric methodology applied, the development of the research took place through several stages. The characterization of the sample used was performed through descriptive statistics, the Jarque and Bera (1980) test, as well as graphs of stability to the residues. In order to verify if the time series are stationary, we will estimate the tests of unit roots in panel, namely the tests of Breitung (2000), Levin, Lin, and Chu (2002), which postulate the same null hypotheses ($H_0 = \text{unit roots}$), while the test of unitary roots in panel of Hadri (2000) postulate contrary hypotheses ($H_0 = \text{stationarity}$). The unit root test by Clemente et al. (1998) is performed to detect structural breaks. To evaluate the integration between the banking sectors of Central Europe we use the Gregory and Hansen methodology (1996) that identifies structural breakdowns. To examine the significance of causal relationships between the markets under analysis, we used the VAR *Granger Causality/Block Exogeneity Wald Tests model*, which employs Wald statistics, which tests whether the null hypothesis that the coefficients of the out-of-date endogenous variables of the variable “cause” are null or not “cause” in the Grangerian sense of the dependent variable. Additionally, and to determine the number of lags to be included in the causality tests, we used the criteria LR sequential modified (each test at 5% level), FPE (Final prediction error), AIC (Akaike information criterion), and to measure the robustness of the model we apply the VAR Residual Residual Serial Correlation LM Tests.

RESULTS

Figure 1 shows the evolution of the banking sectors of Czech Republic, Poland, Romania, Russia and Slovakia from January 2, 2017 to August 10, 2020, which comprehends a period of great complexity,

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due to understanding the outbreak of the global pandemic (Covid-19). Results show that all stock markets (using the banking sector) show structural breaks and sharp volatility in the first months of 2020.

Figure 1. Evolution, in price levels, of the banking sector in the 6 stock markets, from January 2, 2017 to August 10, 2020

Source: Own elaboration.

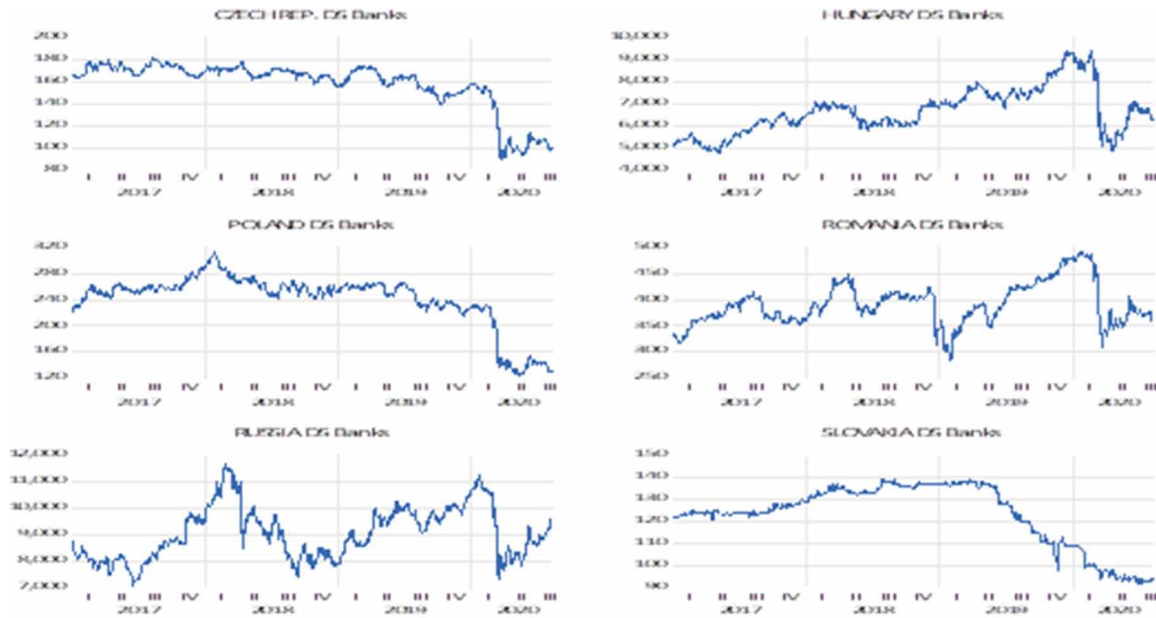


Figure 2 shows the evolution, in returns, of the banking sector in the stock markets from the 6 countries under analysis. The graphical analysis of the indices shows that they present very similar patterns of behavior during the sampling period, and that these patterns were strongly marked by the occurrence of the global pandemic (Covid-19). On the other hand, the graphic analysis also allows to verify the existence of a bear market period between February, March and April 2020, characterized by a sharp drop in the prices of indices, due to the evolution of the global pandemic (Covid-19).

Table 2 shows the main descriptive statistics of the 6 banking sectors under review. For this purpose, the stock prices of the indices have been transformed into daily returns (logarithm of first differences). The banking sector of Hungary, Romania and Russia show a positive average of the daily returns, while the banking sectors of the Czech Republic, Poland and Slovakia show negative returns (on average). Hungary's banking sector has the highest standard deviation (0.018403), while Romania's banking sector has the highest level of kurtosis (37.88904) and asymmetry (-2.433845). In addition, the Jarque-Bera test corroborates that the analyzed data series do not follow a normal distribution.

Figure 3 shows the stability tests performed on the residues of the time series of the banking sectors of Central Europe, allowing to assess the existence of disturbances in variance. Additionally, when examining the graphs and the probability limits of 95% we verified the existence of violation of probability limits, therefore, the time series show an unstable behavior.

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Figure 2. Evolution, in returns, of the banking sector in the 6 stock markets, from January 2, 2017 to August 10, 2020

Source: Own elaboration.

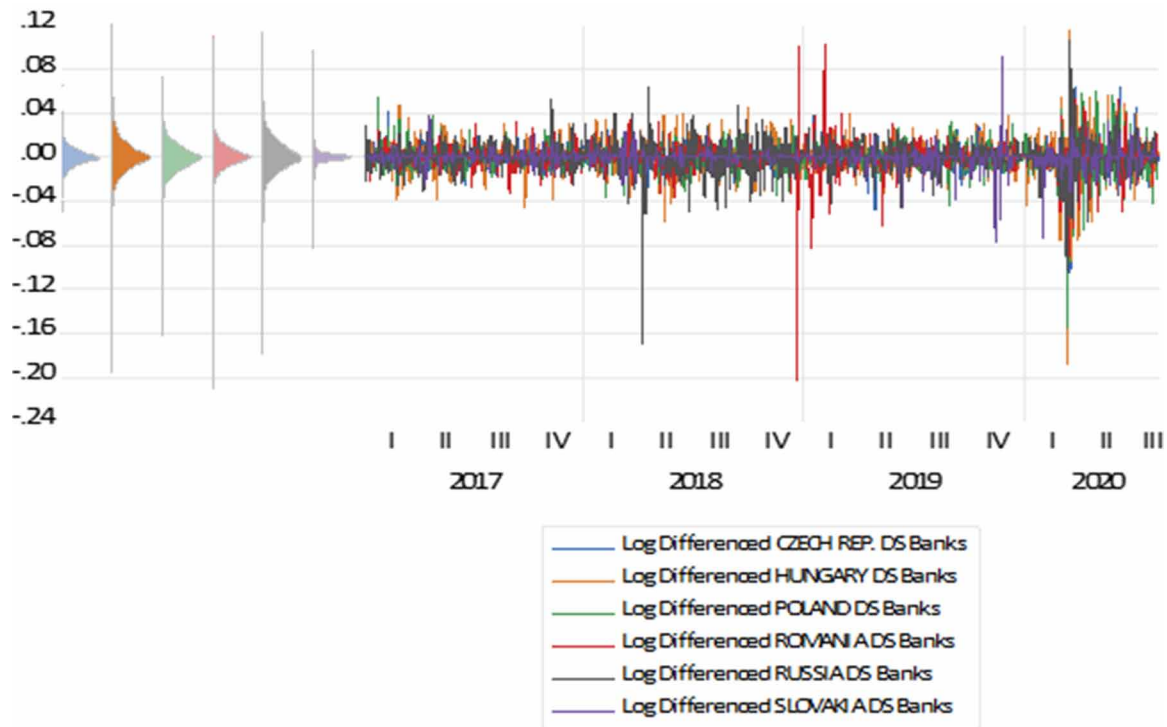


Table 2. Descriptive statistics, in returns, of the banking sector in the 6 stock markets, from January 2, 2017 to August 10, 2020

	CZECH REP DS BANKS	HUNGARY DS BANKS	POLAND DS BANKS	ROMANIA DS BANKS	RUSSIA DS BANKS	SLOVAKIA DS BANKS
Mean	-0.000529	0.000247	-0.000562	0.000138	0.000122	-0.000274
Std. Dev..	0.012324	0.018403	0.015335	0.015919	0.016931	0.008425
Skewness	-1.301479	-1.407061	-1.328284	-2.433845	-1.227152	-0.699508
Kurtosis	18.07550	18.84163	18.32468	37.88904	18.09318	36.31779
Jarque-Bera	9166.810***	10139.33***	9474.538***	48603.47***	9158.256***	43554.59***
Observations	940	940	940	940	940	940

Source: Own elaboration.

In order to validate if the time series of the banking sectors of Czech Republic, Poland, Romania, Russia and Slovakia follow a white noise (mean = 0; constant variance), we use the panel unit root tests of Breitung (2000), Levin, Lin, and Chu (2002) that postulate the same null hypotheses ($H_0 = unitary\ roots$). We also applied the panel unit root test of Hadri (2000) which postulates a contrary hypothesis (

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$H_0 = \text{stationarity}$). The intersection of unit root tests show the stationarity activity, in the first differences ($\frac{P_n}{P_{n-1}}$) (see tables 3, 4, 5 and 6).

Figure 3. Stability tests carried out on residues of the banking sector in the 6 stock markets, from January 2, 2017 to August 10, 2020
Source: Own elaboration.

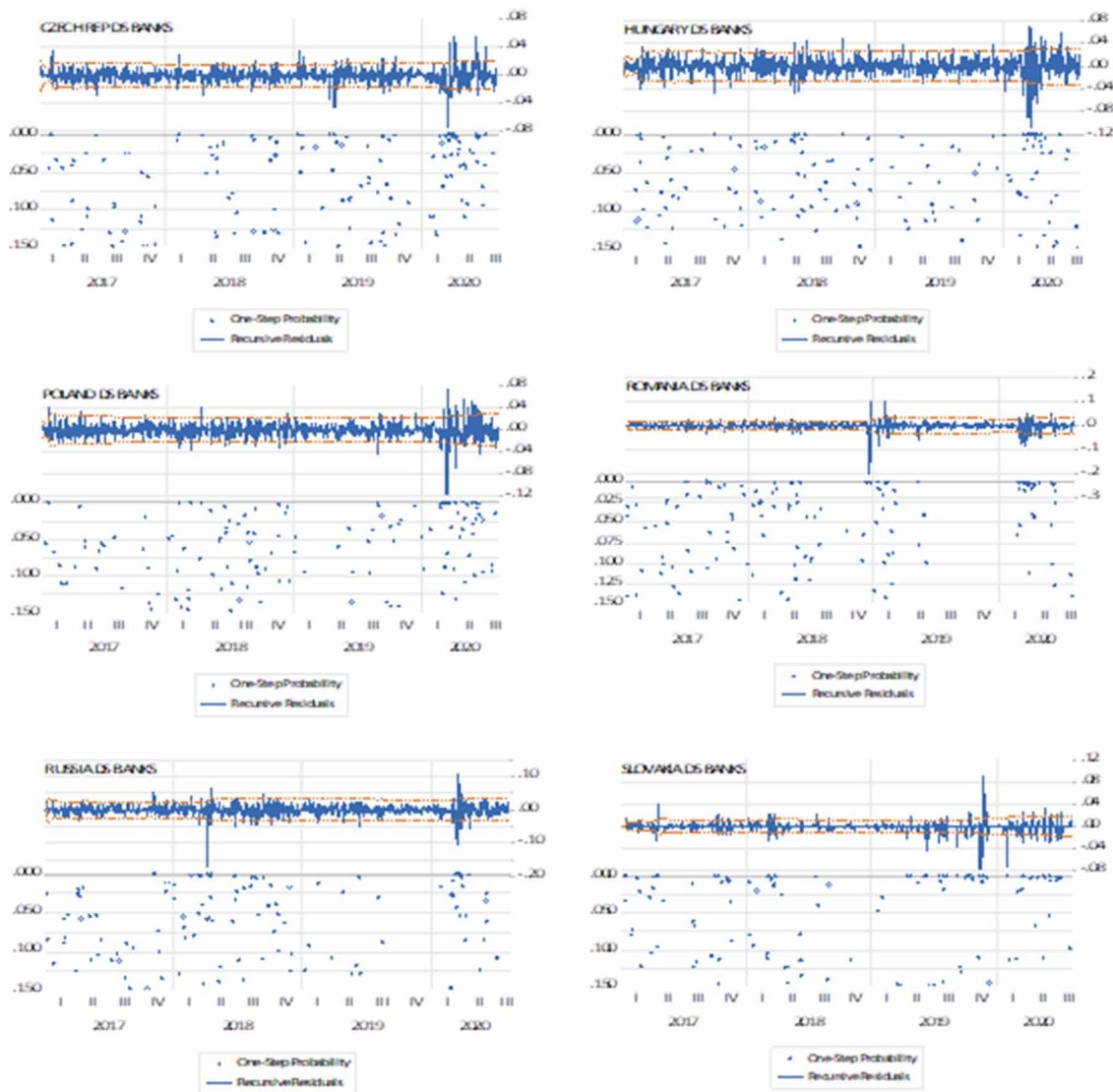


Figure 4 shows the results of unit root tests with structural breaks by Clemente et al. (1998), in the pre Covid subperiod, for the banking sectors of Czech Rep. (29/04/2019), Hungary (14/05/2018), Poland

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(25/01/2017), Romania (21/12/2018), Russia (09/04/2018), and Slovakia (17/07/2019). These results show that there is no pattern in structural breaks for all markets.

Table 3. Levin, Lin and Chu (2002) panel unit root tests, applied to the banking sector in the 6 stock markets, from January 2, 2017 to August 10, 2020

Method				Statistic	Prob.		
Levin, Lin & Chu t*				-78.7321***	0.0000		
Series	2nd stage Coefficient	Variance Of Reg	HAC of Dep.	Lag	Max Lag	Band-Width	Note
D(CZECH_REP_DS_BANKS)	-0.93288	2.7137	0.0712	0	21	75.0	939
D(HUNGARY DS BANKS)	-0.99764	14631.	387.97	0	21	76.0	939
D(POLAND DS BANKS)	-0.99313	9.9690	0.3227	0	21	68.0	939
D(ROMANIA DS BANKS)	-0.92394	34.337	0.8037	0	21	88.0	939
D(RUSSIA DS BANKS)	-1.00580	22953.	593.70	0	21	82.0	939
D(SLOVAKIA DS BANKS)	-1.24257	0.8931	2.0616	1	21	0.0	938
	Coefficient	T-Stat	Reg SE	mu*	sig*		Note
Pooled	-0.99295	-70.929	1.003	-0.500	0.707		5633

Note: ***, ** represents significance at 1% and 5%. Respectively.

Source: Own elaboration

Table 4. Breitung (2000) panel unit root tests, applied to the banking sector in the 6 stock markets, from January 2, 2017 to August 10, 2020

Method			Statistic	Prob.
Breitung T-Statstat			-21.2315***	0.0000
Series	S.E. of Regression	Lag	Max Lag	Note
D(CZECH_REP DS_BANKS)	1.77120	4	4	935
D(HUNGARY DS BANKS)	130.859	4	4	935
D(POLAND DS BANKS)	3.40758	4	4	935
D(ROMANIA DS BANKS)	6.37587	4	4	935
D(RUSSIA DS BANKS)	162.520	4	4	935
D(SLOVAKIA DS BANKS)	1.06675	4	4	935
	Coefficient	T-Stat	Reg SE	Note
Pooled	-0.46677	-21.232	0.022	5604

Note: ***, ** represents significance at 1% and 5%. Respectively.

Source: Own elaboration

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Table 5. Im, Pesaran and Shin, panel unit root tests, applied to the banking sector in the 6 stock markets, from January 2, 2017 to August 10, 2020

Method					Statistic	Prob.	
Im, Pesaran and Shin W-stat					-34.8151***	0.0000	
Series	T-Stat	Prob.	E(t)	And(Var)	Lag	Max Lag	Note
D (CZECH_REP DS BANKS)	-12.418	0.0000	-2.135	0.629	4	4	935
D (HUNGARY DS BANKS)	-13.088	0.0000	-2.135	0.629	4	4	935
D (POLAND DS BANKS)	-12.677	0.0000	-2.135	0.629	4	4	935
D (ROMANIA DS BANKS)	-13.373	0.0000	-2.135	0.629	4	4	935
D (RUSSIA DS BANKS)	-12.536	0.0000	-2.135	0.629	4	4	935
D (SLOVAKIA DS BANKS)	-16.352	0.0000	-2.135	0.629	4	4	935
Average	-13.407		-2.135	0.629			

Note: ***, ** represents significance at 1% and 5%. Respectively.
Source: Own elaboration

Table 6. Hadri (2000) panel unit root tests, applied to the banking sector in the 6 stock markets, from January 2, 2017 to August 10, 2020

Method			Statistic	Prob.
Hadri Z-statstat			-1.29607	0.9025
Heteroscedastic Consistent Z-statstat			-1.36259	0.9135
Series	Lm	Variance Hac	Bandwidth	Note
D (CZECH REP DS BANKS)	0.0342	3.233529	3.0	940
D (HUNGARY DS BANKS)	0.0464	15023.11	6.0	940
D (POLAND DS BANKS)	0.0312	10.18116	6.0	940
D (ROMANIA DS BANKS)	0.0368	40.99412	5.0	940
D (RUSSIA DS BANKS)	0.0432	21258.32	3.0	940
D (SLOVAKIA DS BANKS)	0.0686	0.552518	5.0	940

Note: ***, ** represents significance at 1% and 5%. Respectively.
Source: Own elaboration

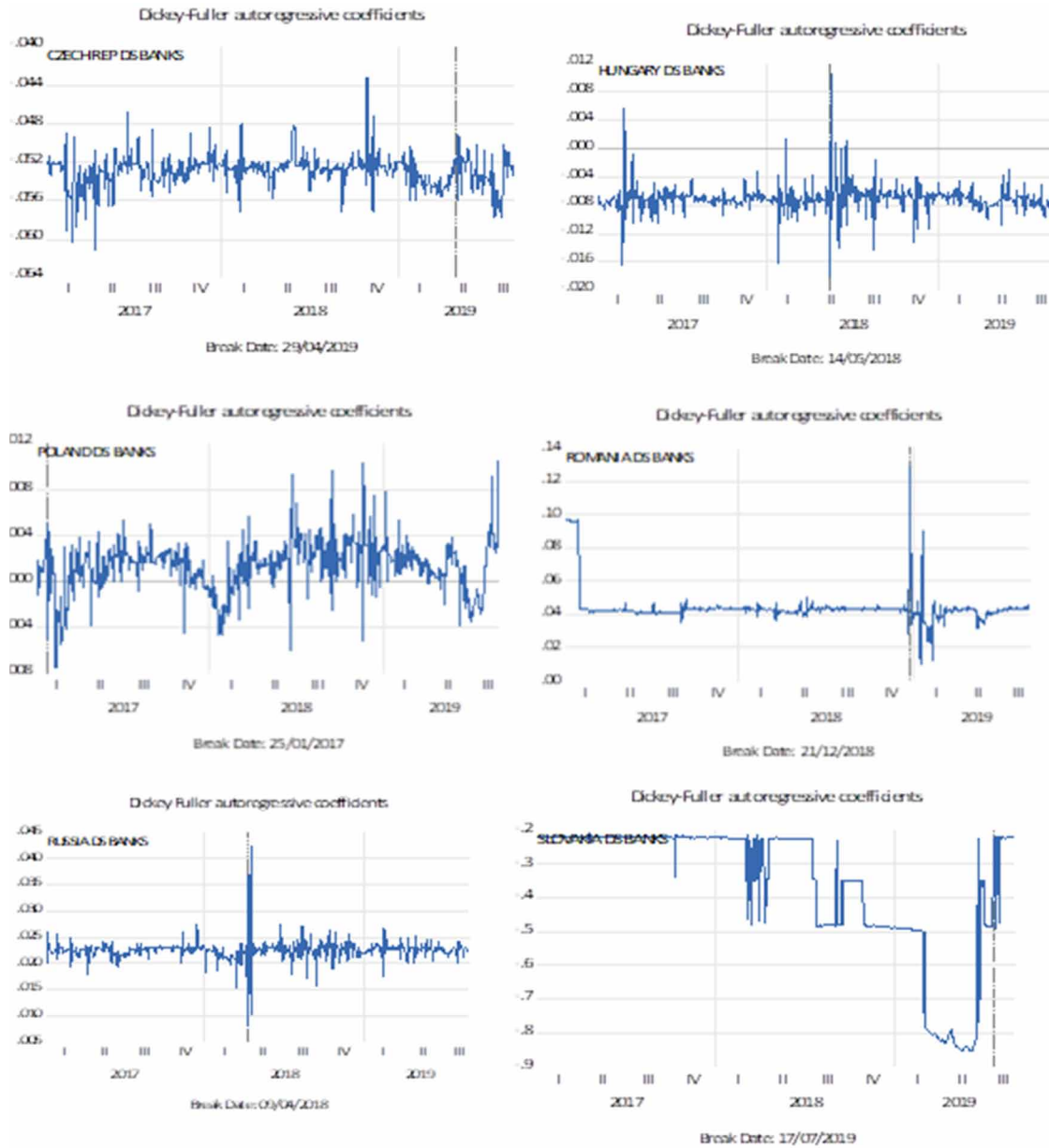
Figure 5 shows the results of unit root tests, with structural breaks, by Clemente et al. (1998), in the Covid subperiod for the banking sectors of Czech Rep. (18/03/2020), Hungary (12/03/2020), Poland (12/03/2020), Romania (12/03/2020), Russia (18/03/2020) and Slovakia (25/11/2019). Evidence shows a pattern in the structural breaks, which are concentrated in March 2020, with the exception of Slovakia.

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These findings are corroborated by the authors He, Liu, Wang, and Yu (2020), who also showed structural breakdowns in the stock markets, resulting from the global pandemic (Covid-19).

Figure 4. Stationarity tests with structural breaks by Clemente et al. (1998), in returns, for the pre-Covid subperiod.

Source: Own elaboration.



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Figure 5. Stationarity tests with structural breaks by Clemente et al. (1998), in returns, for the Covid subperiod.

Source: Own elaboration.

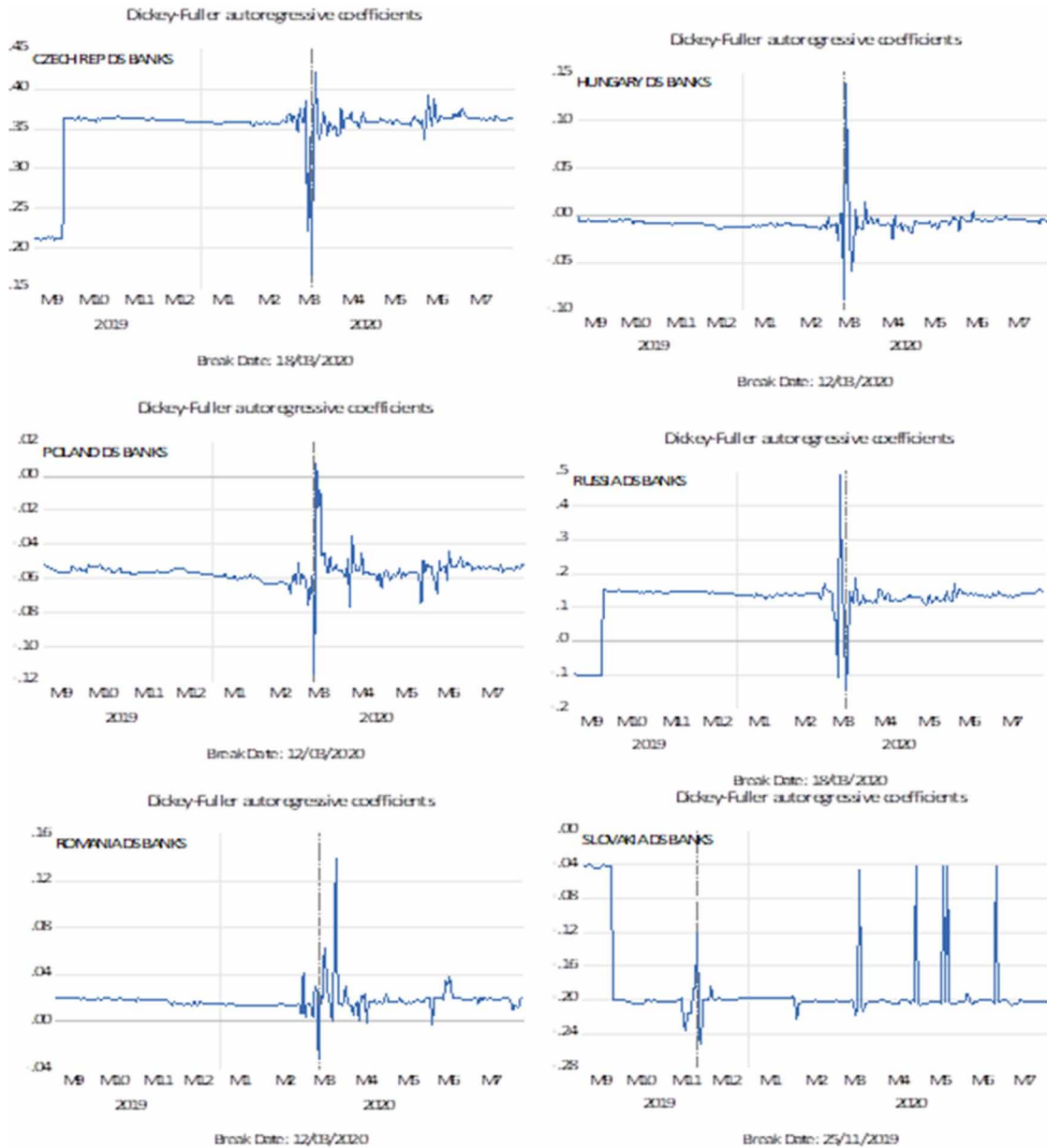


Table 7 shows the results of the Gregory-Hansen test in the Pre Covid subperiod, which exhibit 7 integrations (out of 30 possible), meaning that these markets are mostly segmented. The banking sectors of Hungary, Poland, and Russia have 2 integrations (out of 5 possible). The banking sector of Romania, on the other hand, shows only one integration, while the banking sector in the stock markets of Czech

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Republic and Slovakia did not show any integration with their peers. These findings suggest that the hypothesis of portfolio diversification is possible in these regional markets (banking sector).

Table 7. Gregory-Hansen tests in the pre Covid subperiod

Markets	T-statistic	Method	Lags	Break Date	Results
HUNGARY DS Banks / CZECH REP. Banks DS	-4.72*	Trend	0	10/05/2018	Integration
HUNGARY DS Banks / SLOVAKIA DS Banks	-5.32**	Trend	0	10/05/2018	Integration
POLAND DS Banks / RUSSIA DS Banks	-5.07**	Regime	0	02/04/2019	Integration
POLAND DS Banks / SLOVAKIA DS Banks	-6.51***	Regime	0	05/03/2018	Integration
ROMANIA DS Banks / SLOVAKIA DS Banks	-4.90*	Trend	2	24/12/2018	Integration
RUSSIA DS Banks / POLAND DS Banks	-4.75*	Trend	0	27/07/2018	Integration
RUSSIA DS Banks / SLOVAKIA DS Banks	-48.57**	Regime	1	03/04/2018	Integration

Notes: The asterisks ***, **, * indicate statistical significance at 1%, 5% and 10%, respectively.
Source: Own elaboration.

Table 8 shows the results of the Gregory-Hansen test in the Covid subperiod, which shows 27 integrations (out of 30 possible). The banking sectors of the Czech Republic, Poland, Romania, Russia and Slovakia have 5 integrations (out of 5 possible). Hungary, on the other hand, shows two integrations with its peers. Additionally, we can also see that most of the structural breaks occur in March 2020. These results when compared to the previous period (from 7 to 27; out of 30 possible integrations) show that the global pandemic (Covid-19) has increased integration in these banking sectors, which could call into question portfolio diversification, thus validating the first research question.

To analyze the significance of causal relationships between the banking sectors under analysis, in the subperiod pre Covid, it was applied the *VAR Granger Causality/Block Exogeneity Wald Tests* model. To determine the number of lags to be included in the causality tests, we used the LR criteria sequential modified (each test at 5% level) which suggests 9 lags (see table 9).

In Table 10 we can verify the results of the RESIDUAL VAR Serial Correlation LM Tests, perform VAR estimation with 9 lags, and then perform the autocorrelation test to 10 mislags, the null hypothesis was not rejected, which proves that the model does not present autocorrelation in the residuals, which indicates that the model presents a robust estimation.

Table 11 shows the results of the Granger causality tests, referring to the pre-Covid subperiod and we can verify that these results validate the results of the Gregory-Hansen test for the same subperiod. The banking sectors of Czech Republic, Poland, Romania, Russia and Slovakia are not cause and are also not caused among themselves, except for the Hungary/ Russia markets, which shows that the synchronizations of these markets is relatively low, meaning that the hypothesis of portfolio diversification in this subperiod is feasible.

To analyze the significance of causal relationships between the banking sectors under analysis, in the Covid subperiod, it was used the *VAR Granger Causality/Block Exogeneity Wald Tests*. To determine the number of lags to be included in the causality tests, we used the criteria FPE (Final prediction error), AIC (Akaike information criterion) which suggests 5 lags (see table12).

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Table 8. Gregory-Hansen tests in the Covid subperiod

Markets	T-statistic	Method	Lags	Break Date	Results
CZECH REP. DS Banks / HUNGARY DS Banks	-5.18****	Trend	3	10/03/2020	Integration
CZECH REP. DS Banks / POLAND DS Banks	-6.22****	Trend	2	25/11/2019	Integration
CZECH REP. DS Banks / ROMANIA DS Banks	-5.79****	Trend	1	09/06/2020	Integration
CZECH REP. DS Banks / RUSSIA DS Banks	-5.40**	Trend	1	16/03/2020	Integration
CZECH REP. DS Banks / SLOVAKIA DS Banks	-5.80****	Trend	3	09/03/2020	Integration
HUNGARY DS Banks / ROMANIA DS Banks	-4.74*	Regime	0	02/04/2020	Integration
HUNGARY DS Banks / SLOVAKIA DS Banks	-5.20**	Trend	1	09/03/2020	Integration
POLAND DS Banks / CZECH REP. Banks DS	-6.16****	Trend	2	25/11/2019	Integration
POLAND DS Banks / HUNGARY DS Banks	-5.89****	Regime	0	09/03/2020	Integration
POLAND DS Banks / ROMANIA DS Banks	-5.68****	Regime	0	09/03/2020	Integration
POLAND DS Banks / RUSSIA DS Banks	-5.65****	Regime	3	09/03/2020	Integration
POLAND DS Banks / SLOVAKIA DS Banks	-5.87****	Regime	2	09/03/2020	Integration
ROMANIA DS Banks / CZECH REP. Banks DS	-5.80*	Trend	1	09/03/2020	Integration
ROMANIA DS Banks / HUNGARY DS Banks	-5.43**	Trend	0	09/03/2020	Integration
ROMANIA DS Banks / POLAND DS Banks	-5.10**	Trend	0	09/03/2020	Integration
ROMANIA DS Banks / RUSSIA DS Banks	-5.72****	Trend	0	09/03/2020	Integration
ROMANIA DS Banks / SLOVAKIA DS Banks	-6.64****	Trend	0	09/03/2020	Integration
RUSSIA DS Banks / CZECH REP. Banks DS	-5.77****	Trend	0	02/03/2020	Integration
RUSSIA DS Banks / HUNGARY DS Banks	-4.77*	Trend	0	03/03/2020	Integration
RUSSIA DS Banks / POLAND DS Banks	-5.33**	Trend	0	02/03/2020	Integration
RUSSIA DS Banks / ROMANIA DS Banks	-5.36**	Trend	0	03/03/2020	Integration
RUSSIA DS Banks / SLOVAKIA DS Banks	-6.76****	Trend	1	06/03/2020	Integration
SLOVAKIA DS Banks / CZECH REP. Banks DS	-5.61****	Trend	0	28/01/2020	Integration
SLOVAKIA DS Banks / HUNGARY DS Banks	-5.55****	Trend	0	28/01/2020	Integration
SLOVAKIA DS Banks / POLAND DS Banks	-5.58****	Trend	0	28/01/2020	Integration
SLOVAKIA DS Banks / ROMANIA DS Banks	-5.57****	Trend	0	28/01/2020	Integration
SLOVAKIA DS Banks / RUSSIA DS Banks	-5.63**	Trend	0	28/01/2020	Integration

Notes: The asterisks ***, **, * indicate statistical significance at 1%, 5% and 10%, respectively.

Source: Own elaboration.

Table 9. VAR Lag Order Selection Criteria from January 2, 2017 to August 10, 2020

Lag	LogL	Lr	Fpe	Cbl	Sc	Hq
9	12979.99	55.74999*	3.68e-24	-36.93427	-34.75221	-36.08993

Source: Own elaboration.

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Table 10. VAR Residual Serial Correlation LM Tests from January 2, 2017 to August 10, 2020

Lag	LRE* stat	Df	Prob.	Rao F-Statstat	Df	Prob.
10	36.09598	36	0.4642	1.003037	(36, 2725.4)	0.4642

Note: *Edgeworth expansion corrected likelihood ratio statistic.

Source: Own elaboration.

Table 11. Granger Causality Tests/Block Exogeneity Wald Tests, from January 2, 2017 to August 10, 2020

	CZECH REP	HUNGARY	POLAND	ROMANIA	RUSSIA	SLOVAKIA
CZECH REP	*****	1.39(9)	0.81(9)	1.47(9)	0.99(9)	0.88(9)
HUNGARY	0.83(9)	*****	1.47(9)	1.82(9)	1.56(9)	1.32(9)
POLAND	0.26(9)	0.81(9)	*****	1.01(9)	0.19(9)	0.75(9)
ROMANIA	1.34(9)	1.06(9)	0.66(9)	*****	0.50(9)	0.81(9)
RUSSIA	0.55(9)	2.11(9)**	0.85(9)	0.45(9)	*****	1.04(9)
SLOVAKIA	0.64(9)	0.48(9)	0.73(9)	0.10(9)	1.29(9)	*****

Notes: Column markets “cause” online markets. The lateral values in parentheses refer to lags. ***, **, *. represent significance at 1%, 5% and 10%, respectively.

Source: Own elaboration

Table 12. VAR Lag Order Selection Criteria from January 2, 2017 to August 10, 2020

Lag	LogL	Lr	Fpe	Cbl	Sc	Hq
5	4040.494	77.15064	2.65e-22*	-32.66521*	-29.93524	-31.56473

Source: Own elaboration.

In Table 13 we can verify the results of the RESIDUAL VAR Serial Correlation LM Tests, perform VAR estimation with 5 lags, and then perform the autocorrelation test to 6 misdemeanors, the null hypothesis was not rejected, which proves that the model does not present autocorrelation in the residues, which indicates that the model presents a robust estimation.

Table 13. VAR Residual Serial Correlation LM Tests from January 2, 2017 to August 10, 2020.

Lag	LRE* stat	Df	Prob.	Rao F-Statstat	Df	Prob.
6	36.06185	36	0.4658	1.002759	(36, 876.6)	0.4660

Note: *Edgeworth expansion corrected likelihood ratio statistic.

Source: Own elaboration.

Table 14 shows the results of the Granger causality tests for the Covid-19 subperiod, and we can see that causalities between markets increased significantly (from 1 causality to 14). The Czech Republic banking sector causes the markets of Hungary, Romania and Russia, while Hungary banking sector is

only causing Romania. Poland banking sector causes all markets except Slovakia, while Romania banking causes Czech Republic, Poland and Russia markets. Russia causes all markets except Slovakia, while this banking sector does not cause any markets. Additionally, the most caused banking sectors in the granger assumption are Romania (4), Czech Republic (3), Hungary (3), Russia (3), Poland (2) and Slovakia (0). In view of these results and bearing in mind the results of integration, we may identify that the crisis, caused by the global pandemic of 2020, increased the synchronization between these regional banking sectors. Thus, this reduced significantly the hypothesis of implementing efficient diversification portfolio, which is in line with our second research question that greater integration increases market shocks.

Table 14. Causality Tests of Granger / Block Exogeneity Wald Tests, from January 2, 2017 to August 10, 2020

	CZECH REP	HUNGARY	POLAND	ROMANIA	RUSSIA	SLOVAKIA
CZECH REP	*****	1.66(5)	6.14(5)***	4.41(5)***	8.41(5)***	0.31(5)
HUNGARY	1.95(5)*	*****	4.82(5)***	1.49(5)	10.12(5)***	0.10(5)
POLAND	1.79(5)	1.80(5)	*****	2.98(5)**	10.63(5)***	0.54(5)
ROMANIA	2.65(5)**	2.31(5)**	2.58(5)**	*****	9.97(5)***	0.69(5)
RUSSIA	2.30(5)**	1.76(5)	3.01(5)**	3.08(5)**	*****	0.32(5)
SLOVAKIA	0.21(5)	0.61(5)	1.09(5)	0.74(5)	1.28(5)	*****

Notes: Column markets “cause” online markets. The lateral values in parentheses refer to lags. ***, **, *. represent significance at 1%, 5% and 10%, respectively.

Source: Own elaboration.

CONCLUSION

In general, the conclusion to be withhold and sustained in the results, obtained through the econometric models, is that the global pandemic had a significant impact on the memory properties of the banking sectors of Central Europe. The results indicate that, with the accentuation of the global pandemic (Covid-19), integration and market shocks have increased exponentially, which could jeopardize the implementation of efficient strategies for the diversification of portfolios. These findings are important to market regulators in order for them to take steps to ensure better information among the international financial markets.

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Chapter 16

COVID-19 Pandemic and Its Influence on Safe Havens: An Examination of Gold, Silver, and Platinum

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ABSTRACT

This chapter aims to analyze the rebalancing of portfolios in the financial markets of China Hong Kong, Malaysia, Singapore, Indonesia, Japan, Philippines, Thailand, South Korea, gold (Bullion (Zurich) kg(995) CHF), silver (Paris Spot E/KG), platinum (Paris Spot E/KG), in the period from 2 September 2019 to 2 September 2020. The rhoDCCA results show that platinum is not a safe port for portfolio rebalancing in these regional markets, while silver is also not a safe port for the markets of Malaysia (KLSE), South Korea (KOSPI). As far as gold is concerned, the authors do not see any strong rhoDCCA which could be a safe harbor for these regional markets in this period of the 2020 pandemic crisis, which partly validates the first research question. The exponents detrended fluctuation analysis (DFA) show pronounced long memories, with the exception made to the gold market that shows signs of balance, that is, the second question of investigation is validated.

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INTRODUCTION

The international financial markets have seen a succession of major setbacks in recent months, triggered by the Covid-19, followed by a series of collapses, the oil war, and currency fluctuations. The economic turbulence associated with the coronavirus pandemic in 2019-2020 has serious repercussions on financial markets, particularly in the stock, bond and commodity markets (Sudha, Sornaganesh and Sathish, 2020).

There is no numerically specific definition of a crash in a stock market, but the term commonly applies to falls of more than 10%, over a period of several days. During the week of February 24-28, 2020, stock markets broke down due to the evolution of the Covid-19 pandemic. The FTSE 100 fell 13%, while the DJIA and S&P 500 Index fell 11-12% respectively, which represents the biggest weekly drop since the 2007-2008 financial crisis. On Monday, March 9, 2020, following the launch of the oil price war between Russia and Saudi Arabia in 2020, the UK and other European stock markets fell by almost 8%. Asian markets fell sharply, and the S&P 500 index fell 7.60%, while Italy's FTSE MIB fell 11.17% (2,323.98 points). On March 12, 2020, the day after President Donald Trump announced Europe's travel ban, stock prices fell sharply again. The DJIA fell 9.99%, the biggest daily drop since Black Monday (1987), despite the Federal Reserve announcing it would inject \$1.5 trillion into money markets. The S&P 500 and NASDAQ each fell about 9.5%, while the main European stock market's fell more than 10%. On March 16, 2020, after it became clear that the recession was inevitable, the DJIA fell 12.93% (2,997 points). This was the biggest drop since Black Monday (1987), surpassing the fall of the previous week. The NASDAQ Composite fell 12.32% and the S&P 500 index fell 11.98% (Akhtaruzzaman, Boubaker, Lucey, and Sensoy, 2020; Ali, Alam, and Rizvi, 2020; Okorie and Lin, 2020; Yan, Logan, Tu, and Zhang, 2020; Chappelow, 2020).

Considering these events, this chapter aims to analyze the rebalancing of portfolios in the financial markets of China (SHCOMP), Hong Kong (HSI), Malaysia (KLSE), Singapore (TRX SGP), Indonesia (TRX IDP), Japan (JPNK 400), Philippines (PSEi), Thailand (SET), South Korea (KOSPI), Gold (Bullion (Zurich) kg (995) CHF), Silver (Paris Spot E/KG), Platinum (Paris Spot E/KG) from September 2, 2019 to September 2, 2020. To carry out this analysis, different approaches were undertaken, and two main research questions were defined in order to answer if: (i) Gold, Silver, and Platinum will be a safe haven for portfolio rebalancing in Asian markets? (ii) the global pandemic (Covid-19) increased persistence in the financial markets under analysis? The results suggest that the Platinum market is not a safe haven for portfolio rebalancing in these regional markets, while the Silver market is also not a safe haven, but only for the Malaysia (KLSE) and South Korea (KOSPI) markets. As far as Gold market is concerned, we did not find strong *rhoDCCA* which may induce that it could work as a safe haven for these regional markets, during the global pandemic crisis. The Exponents *Detrended Fluctuation Analysis (DFA)* show sharp long memories, with the exception made to the Gold market that shows signs of balance.

This research adds two main contributions to the literature. The first contribution refers to the study of portfolio rebalancing in Asian financial markets. As far as we know there are studies that analyzed the rebalancing in stock markets, but the research, sample, and approach questions were different from those followed in this chapter (Yamaka and Maneejuk, 2020; Bouri, Shahzad, Roubaud, Kristoufek, and Lucey, 2020). The second contribution is of econophysical nature, due to the comparative models *Detrended Fluctuation Analysis (DFA)* and *Detrended Cross-Correlation Analysis (pDCCA)* which have the possibility of evaluating correlations in the context of non-stationarity. DFA is an analysis method that examines temporal dependence on non-stationary data series. This technique, through the assump-

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tion that time series are non-stationary, avoids spurious results when the analysis focuses on the relationships of the data series in the long-term. The non-trend cross-correlation coefficient (*pDCCA*) from Zebende (2011) is a method to quantify the level of cross-correlation between two non-stationary time series.

In terms of structure this essay is organized in 5 sections. Section 1 is represented by the current introduction. In section 2, a Literature Review is presented regarding the presence of Safe Heaven for the portfolio rebalancing. Section 3 describes the data and methodology. Section 4 contains the results. Finally, section 5 presents the general conclusions of the work.

LITERATURE REVIEW

The development of the efficient market hypothesis (EMH) has motivated subsequent studies to analyze this issue, according to which the current price of assets reflects all available information at a given time, and the price adjusts rapidly, as new and unforeseen information comes to market (Lawrence H. Summers, 1986).

According to Fama (1965a) an efficient market is defined as a market in which there are many rational traders, who maximize profit and actively compete, and try to predict future assets values based on the information available. Thus, in an efficient market, competition between many sophisticated traders leads to a situation where actual asset prices at any time reflect the effects of all available information.

A market in which bond prices change independently of each other is defined as a random walk market (Fama, 1965a). Fama (1965b) related the theory of random walk to the empirical study on market efficiency. The theory of random walk requires successive price changes to be independent and follow a probability distribution.

Beckmann and Czudaj (2013), Beckmann, Berger, and Czudaj (2015), Choudhry, Hassan and Shabi (2015), El Hedi Arouri et al. (2015) analyzed whether Gold markets would be a safe haven for international financial markets. Beckmann and Czudaj (2013) examined whether Gold provides the ability to cover against inflation from a new perspective. To this end, they used data from four major economies, namely the US, the United Kingdom, the Eurozone and Japan, from January 1970 to December 2011. The authors show that Gold is able to cover future inflation in the long term, and there is a stronger aptitude for the US and the UK when compared to Japan and the Eurozone. Beckmann, Berger, and Czudaj (2015) analyzed whether the Gold market exhibits the function of a safe haven, including 18 individual markets, as well as five regional indexes, from January 1970 to March 2012, with a monthly frequency. The authors show that Gold works like a safe haven. Choudhry, Hassan, and Shabi (2015) studied the dynamic nonlinear co-movements between Gold returns and the returns of the UK stock markets (FTSE 100), US (S&P 500) and Japan (Nikkei 225). The authors show that Gold may not be a safe haven during the 2008 financial crisis period, due to the bidirectional interdependence between Gold returns and, stock returns as well as stock market volatilities. El Hedi Arouri et al. (2015) show that there are negative spillovers of extreme risk between Gold and stock markets and between Gold and U.S. dollar exchange markets, indicating that Gold can act as an effective safe haven against extreme movements in U.S. dollar stocks and exchange rates. In addition, the global financial crisis may affect the role Gold market as a safe haven.

Batten, Ciner, Kosedag and Lucey (2017), Tursoy and Faisal (2018), Siddiqui and Roy (2019), D. Huang and Kilic (2019), examined whether Gold, Platinum and Crude Oil markets, would be a safe haven for portfolio rebalancing. Batten, Ciner, Kosedag and Lucey (2017) show the lack of causal relationships between the price of Gold and the analyzed stock markets. Tursoy and Faisal (2018) show a negative relationship between Gold price and stock prices and a positive relationship between crude oil and stock prices. Siddiqui and Roy (2019) show that Gold is a more effective hedge asset than Crude Oil, for India's institutional investors. D. Huang and Kilic (2019) show that Gold prices fall in recessions, although to a lesser extent than Platinum prices.

Balcilar, Demirer, Gupta, and Wohar (2020), Bouri, Shahzad, Roubaud, Kristoufek, and Lucey (2020), Naeem, Hasan, Arif, Balli, and Shahzad (2020), Yamaka and Maneejuk (2020) examined whether precious metals, sovereign bonds, Bitcoin, Crude Oil could serve as safe and hedge haven for investors in international stock markets. Balcilar, Demirer, Gupta, and Wohar (2020) show that precious metals cause shocks in stock markets in periods of high volatility. However, sovereign bonds present negligible risk in periods of stock stress, implying that these assets serve as a safe haven in the rebalancing of portfolios. Bouri, Shahzad, Roubaud, Kristoufek, and Lucey (2020) show that the benefits of diversification vary in frequency of time, with Bitcoin showing superiority over Gold and the commodity index. Naeem, Hasan, Arif, Balli, and Shahzad (2020) show that the global financial crisis of 2008 accentuated the clashes between BRIC stock markets with oil and gold. Yamaka and Maneejuk (2020) highlight the existence of significant causality between gold shocks and the volatility of Asian stock markets. The authors show strong correlations between the South Korean stock markets and India and the Gold market during the global financial crisis when compared to the pre and post-crisis periods. Furthermore, there are indications of the existence of contagion effects between the gold market and the stock markets analyzed.

In summary, this work aims to contribute to the provision of information to investors and regulators in international stock markets, where individual and institutional investors seek diversification benefits. Therefore, the context of this work is to examine whether Gold, Silver and Platinum will be safe ports in the rebalancing of portfolios in Asia's stock markets.

DATA AND METHODOLOGY

To achieve the research objectives, it was collected daily price index of the financial markets of China (SHCOMP), Hong Kong (HSI), Malaysia (KLSE), Singapore (TRX SGP), Indonesia (TRX IDP), Japan (JPNK 400), Philippines (PSE i), Thailand (SET), South Korea (KOSPI), Gold (Bullion (Zurich) kg (995) CHF), Silver (Paris Spot E/KG) and Platinum (Paris Spot E/KG). Data covers the period from September 2, 2019 to September 2, 2020. The source of information used was the *DataStream* platform, with local currency quotes, to mitigate exchange rate distortions.

As for methodology, the development of the research will take place through several stages. The sample will be characterized by descriptive statistics to verify that the data follow a normal distribution. To validate whether the time series follow a white noise (mean = 0; constant variance), we will use the unit root tests in panel of Levin, Lin, and Chu (2002), Breitung (2000) that postulate the same null hypotheses. In order to answer the research questions, we will use the *Detrended Cross-Correlation Analysis (pDCCA)*, *Detrended Fluctuation Analysis (DFA)* models. The non-trend cross-correlation coefficient (*pDCCA*) of Zebende (2011) is centered on the possibility of measuring the correlations

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between two non-stationary time series at different time scales. The function of this technique is to examine the relationship between values x_k and x_{k+t} at different times. The *Detrended Fluctuation Analysis (DFA)* is an analysis method that examines temporal dependence in non-stationary data series. This technique, by assuming that time series are non-stationary, avoids spurious results when the analysis focuses on the relationships of the data series in the long term. Tables 1 and 2 show the interpretation of exponents \pm_{DFA} and $pDCCA$.

Table 1. Detrended Fluctuation Analysis α_{DFA}

Exponent	Type of Signal
$\pm_{DFA} < 0.5$	long-range anti-persistent
$\pm_{DFA} = 0.5$	uncorrelated, white noise
$\pm_{DFA} > 0.5$	long-range persistent

Source: Own elaboration

Table 2. Detrended cross-correlation coefficient, $DCCA$, levels

Weak	Medium	Strong
$\cong 0,000 \rightarrow \cong 0.333$	$\cong 0.333 \rightarrow \cong 0.666$	$\cong 0.666 \rightarrow \cong 1,000$

Source: Own elaboration

RESULTS

Figure 1 shows the evolution of financial markets, at price levels, from September 2019 to September 2020, which is a period of great complexity, due to understanding the outbreak of the global pandemic (Covid-19). Most of these markets showed structural breaks in February and March 2020.

Figure 1. Evolution, in price level, of the 12 financial markets, in the period from September 2, 2019 to September 2, 2020.

Source: Own elaboration.

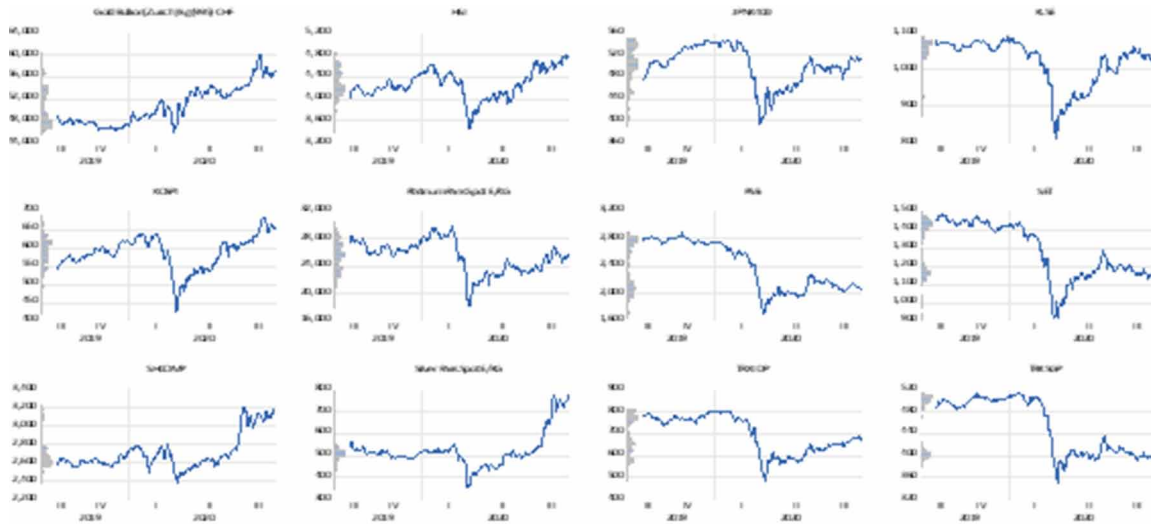
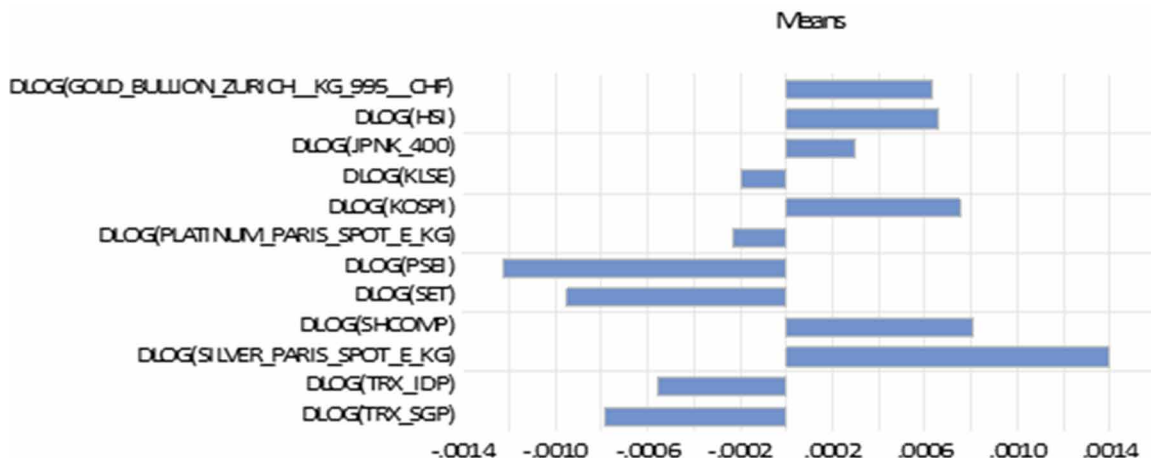


Figure 2 shows the averages of the 12 financial markets under review. Gold (Bullion (Zurich) kg (995) CHF), Hong Kong (HSI), Japan (JPNK 400), South Korea (KOSPI), China (SHCOMP), Silver (Paris Spot E/KG) markets have positive average daily returns. The Markets Malaysia (KLSE), Platinum (Paris Spot E/KG), Philippines (PSEi), Thailand (SET), Indonesia (TRX IDP), Singapore (TRX SGP) show negative average returns.

Figure 2. Average of returns from the 12 financial markets, in the period from September 2, 2019 to September 2, 2020.

Source: Own elaboration.



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Figure 3 shows the standard deviations of the 12 financial markets under analysis. The Silver market (0.024970) has the largest standard deviation, while Platinum (0.022542), SET (0.018779), TRX IDP (0.017599), PSEi (0.017100), KOSPI (0.01684 8), HSI (0.015402), TRX SGP (0.013810), SHCOMP (0.012773), JPNK 400 (0.012811). KLSE (0.010492), Gold (0.010753) markets are the ones that show the lowest risk when compared to the other markets.

Figure 3. Standard deviations of returns from the 12 financial markets, in the period from September 2, 2019 to September 2, 2020.

Source: Own elaboration.

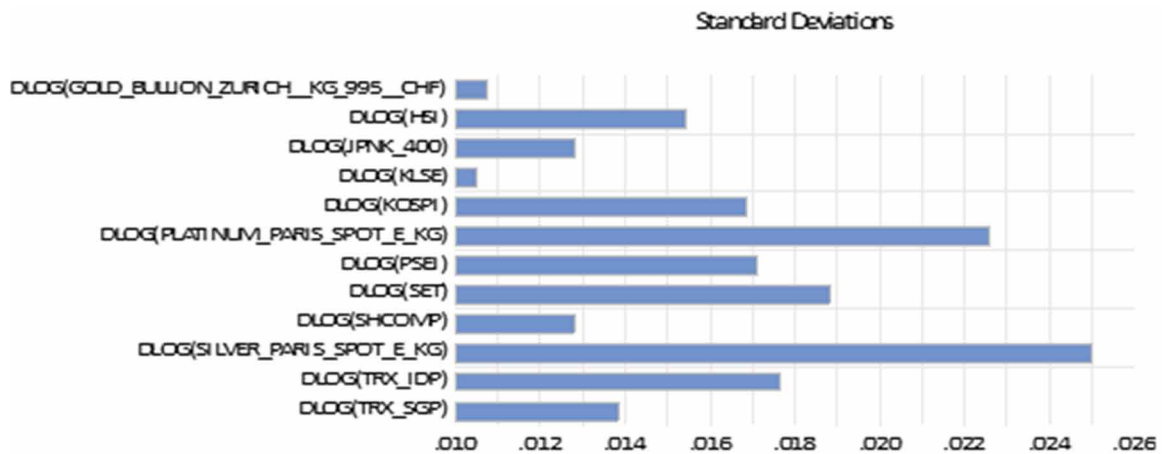


Figure 4. Skewness of returns from the 12 financial markets, in the period September 2, 2019 to September 2, 2020.

Source: Own elaboration.

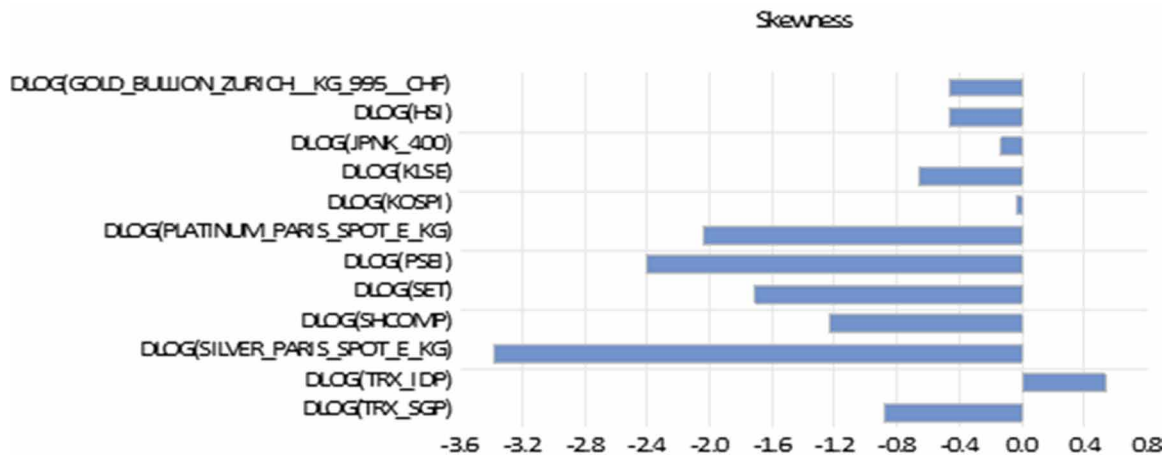
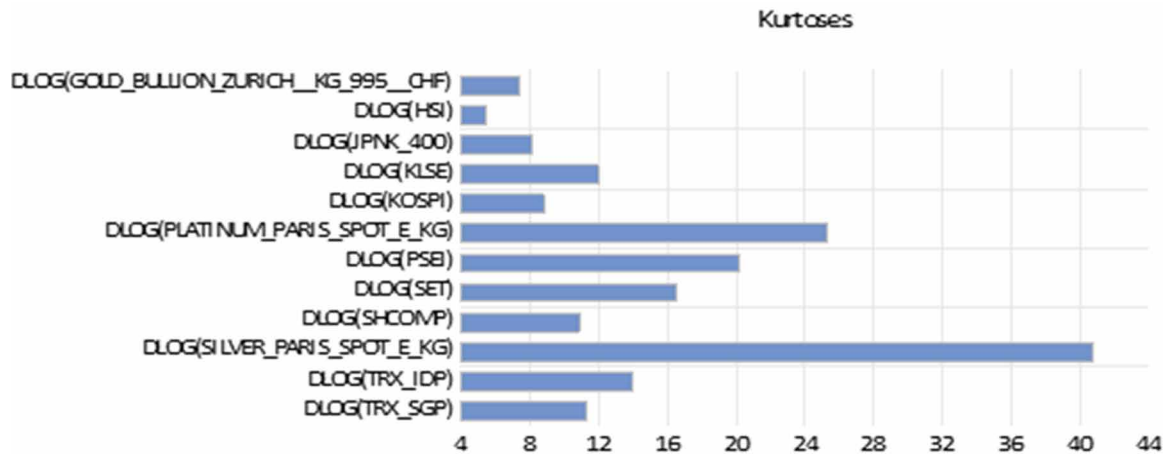


Figure 4 shows the Skewness of the 12 financial markets under analysis and we can see that the Silver market (-3.389678) presents the most pronounced asymmetry. PSEi (-2.411840), Platinum (-2.048446), SET (-1.712194), SHCOMP (-1.233455), TRX SGP (-0.887033), KL (-0.656420), HSI Platinum (-0.467113), Gold (-0.463821), JPNK 400 (-0.133368), KOSPI (-0.039284). The TRX IDP market (0.538358) is the only one with positive asymmetry. These findings indicate that the data do not follow a normal distribution (Skewness = 0).

Figure 5 shows the Kurtoses of the 12 financial markets under analysis and we can see that the Silver market (40.92205) presents the sharpest Kurtose. Platinum markets (25.45336), PSEi (20.25946) SET (16.63944), TRX IDP (13.99894), KLSE (12.02903), TRX SGP (11.3 0653), SHCOMP (10.93396), KOSPI (8.870023), JPNK 400 (8.185755), Gold (7.487587), HSI (5.472876) lest pronounced kurtoses. These results validate the indications that time series do not follow a normal distribution, because asymmetry and Kurtoses are different from reference values (Skewness = 0; Kurtoses = 3).

Figure 5. Kurtoses of returns from the 12 financial markets, in the period from September 2, 2019 to September 2, 2020.

Source: Own elaboration.



As we are estimating time series, we should examine the stationary nature of the series concerning the 12 financial markets. The tests of unitary roots in panel of Levin, Lin and Chu (2002), Breitung (2000) performed postulate the same null hypotheses. The intersection of the unit root tests in panel show the stationability of the time series (return), that is, we are facing a white noise (mean= 0; constant variance), (see tables 3 and 4).

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Table 3. Levin, Lin and Chu stationarity test (2002), applied to the 12 financial markets, in the period from September 2, 2019 to September 2, 2020.

Method			Statistic			Prob.**	
Levin, Lin & Chu t*			-50.2966			0.0000	
Series	2nd stage Coefficient	Variance Of Reg	HAC of Dep.	Lag	Max Lag	Band-Width	Note
Gold	-0.96446	0.0001	4.E-06	0	15	60.0	262
Hsi	-1.09536	0.0002	1.E-05	0	15	42.0	262
JPNK 400	-0.87115	0.0002	3.E-06	0	15	96.0	262
KLSE	-0.97658	0.0001	5.E-06	0	15	41.0	262
KOSPI	-0.85163	0.0003	1.E-05	1	15	47.0	261
Platinum	-0.85465	0.0005	3.E-05	1	15	37.0	261
PSEI	-0.74315	0.0003	1.E-05	2	15	60.0	260
Set	-0.74026	0.0003	3.E-05	4	15	26.0	258
SHCOMP	-1.00972	0.0002	9.E-06	0	15	36.0	262
Silver	-0.93339	0.0006	4.E-05	0	15	34.0	262
TRX IDP	-0.90655	0.0003	1.E-05	0	15	40.0	262
TRX SGP	-0.67478	0.0002	1.E-05	4	15	26.0	258
	Coefficient	T-Stat	Reg SE	mu*	sig*		Note
Pooled	-0.93087	-44.585	1.003	-0.508	0.740		3132

Note: ** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Source: Own elaboration

Table 5 shows the *Detrended cross-correlation coefficient pDCCA* for the period from September 2, 2019 to September 2, 2020. The *rhoDCCA* show 40 cross-correlation coefficients without a strong tendency ($0.666 \rightarrow \cong 1.000$), 24 average correlation coefficients ($\cong 0.333 \rightarrow \cong 0.666$), and 2 weak correlation coefficients ($\cong 0.000 \rightarrow \cong 0.333$). In response to the first research question, the China market (SHCOMP) shows *rhoDCCA* averages with Gold, Silver and Platinum, while the Hong Kong market (HSI) indicate low coefficients with Gold, medium with Silver, and strong with Platinum. The Malaysian (KLSE), South Korea (KOSPI) markets show average cross-correlation coefficients with Gold, and strong with Silver and Platinum, while Singapore's (TRX SGP) markets, Indonesia (TRX IDP), Japan (JPNK 400), the Philippines (PSEi), Thailand (SET), show *rhoDCCA* averages with Gold and Silver, and strong with Platinum. These findings show that Platinum is not a safe haven for portfolio rebalancing in these regional markets, while Silver fails to work as a safe haven for the Malaysia (KLSE) and South Korea (KOSPI) stock markets. As far as Gold is concerned, we do not see strong *rhoDCCA* what could induce that it could be a safe haven for these regional markets, in this period of the 2020 crisis, which partially aligned with the first research question. We also confirm that the trendless cross-correlation coefficients between Asia's stock markets are mostly strong, which implies difficulties in diversifying portfolios. The Gold, Platinum, and Silver markets show strong *rhoDCCA* which calls into question the possibility of portfolio diversification.

Table 4. Breitung (2020) stationarity test applied to the 12 financial markets, in the period from September 2, 2019 to September 2, 2020.

Method			Statistic	Prob.**
Breitung T-Statstat			-32.7286	0.0000
Series	S.E. of Regression	Lag	Max Lag	Note
Gold	0.01496	0	15	262
RHSI	0.02284	0	15	262
JPNK 400	0.01694	0	15	262
KLSE	0.01468	0	15	262
KOSPI	0.01924	1	15	261
Platinum	0.02622	1	15	261
PSEI	0.01809	2	15	260
Set	0.01869	4	15	258
SHCOMP	0.01819	0	15	262
Silver	0.02804	3	15	259
TRX IDP	0.02374	0	15	262
TRX SGP	0.01370	4	15	258
	Coefficient	T-Stat	Reg SE	Note
Pooled	-0.71858	-32.729	0.022	3117

Note: ** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assumes asymptotic normality.

Source: Own elaboration

In table 6 we can see the *DFA* exponents referring to the 12 financial markets of Asia, Gold, Silver and Platinum. The exponents *Detrended Fluctuation Analysis (DFA)* show sharp long memories, particularly in the markets of Malaysia (KLSE), Singapore (TRX SGP), Indonesia (TRX IDP), Japan (JPNK 400), Philippines (PSEi), Thailand (SET), South Korea (KOSPI), and to a lesser extent in the markets of China (SHCOMP), Hong Kong (HSI), Silver and Platinum. The results for the Gold market shows that the random walk *hypothesis* is not rejected, exhibiting signs of balance, which is evidence in line with our second question of investigation. These results show that price changes are not i.i.d.. This situation has implications for investors, as some prices could be predictable, creating opportunities for arbitrage and abnormal returns.

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Table 5. Table summary of the coefficients ρ_{DCCA} for the 12 stock markets in the period from September 2, 2019 to September 2, 2020.

Index	ρ_{DCCA}	Time scale (days)	Trend
SHCOMP / HSI	0.76	n > 62 days	Strong
SHCOMP / KLSE	0.56	n > 19 days	Medium
SHCOMP / TRX SGP	0.58	n > 22 days	Medium
SHCOMP / TRX IDP	0.51	n > 32 days	Medium
SHCOMP / JPNK 400	0.31	n > 25 days	Weak
SHCOMP / PSEi	0.53	n > 29 days	Medium
SHCOMP / SET	0.48	n > 35 days	Medium
SHCOMP / KOSPI	0.51	n > 21 days	Medium
SHCOMP / GOLD	0.35	n > 58 days	Medium
SHCOMP / SILVER	0.33	n > 23 days	Medium
SHCOMP / PLATINUM	0.44	n > 58 days	Medium
HSI / KLSE	0.73	n > 22 days	Strong
HSI / TRX SGP	0.83	n > 35 days	Strong
HSI / TRX IDP	0.77	n > 64 days	Strong
HSI / JPNK 400	0.54	n > 23 days	Medium
HSI / PSEi	0.80	n > 64 days	Strong
HSI / SET	0.78	n > 60 days	Strong
HSI / KOSPI	0.84	n > 64 days	Strong
HSI / GOLD	0.25	n > 24 days	Weak
HSI / SILVER	0.59	n > 64 days	Medium
HSI / PLATINUM	0.71	n > 64 days	Strong
KLSE / TRX SGP	0.89	n > 64 days	Strong
KLSE / TRX IDP	0.82	n > 60 days	Strong
KLSE / JPNK 400	0.78	n > 64 days	Strong
KLSE / PSEi	0.86	n > 62 days	Strong
KLSE / SEPT	0.88	n > 64 days	Strong
KLSE / KOSPI	0.90	n > 64 days	Strong
KLSE / GOLD	0.46	n > 47 days	Medium
KLSE / SILVER	0.74	n > 56 days	Strong
KLSE / PLATINUM	0.81	n > 64 days	Strong
TRX SGP / TRX IDP	0.86	n > 64 days	Strong
TRX SGP / JPNK 400	0.76	n > 64 days	Strong
TRX SGP / PSEi	0.93	n > 54 days	Strong
TRX SGP / SET	0.88	n > 60 days	Strong
TRX SGP/KOSPI	0.91	n > 58 days	Strong
TRX SGP / GOLD	0.42	n > 48 days	Medium
TRX SGP / SILVER	0.65	n > 54 days	Medium
TRX SGP / PLATINUM	0.77	n > 64 days	Strong
IDP TRX / JPNK 400	0.61	n > 52 days	Medium
TRX IDP / PSEi	0.88	n > 48 days	Strong
TRX IDP / SET	0.77	n > 47 days	Strong
TRX IDP / KOSPI	0.85	n > 64 days	Strong
TRX IDP / GOLD	0.34	n > 54 days	Medium
TRX IDP / SILVER	0.62	n > 64 days	Medium
TRX IDP / PLATINUM	0.72	n > 64 days	Strong
JPNK 400 / PSEi	0.71	n > 60 days	Strong
JPNK 400 / SEP	0.83	n > 58 days	Strong
JPNK 400 / KOSPI	0.80	n > 60 days	Strong
JPNK 400 / GOLD	0.46	n > 52 days	Medium
JPNK 400 / SILVER	0.62	n > 64 days	Medium
JPNK 400 / PLATINUM	0.73	n > 64 days	Strong
PSEi / SET	0.84	n > 64 days	Strong

continued on following page

Table 5. Continued

Index	ρ_{DCCA}	Time scale (days)	Trend
PSEI / KOSPI	0.87	n > 58 days	Strong
PSEI / GOLD	0.36	n > 46 days	Medium
PSEI / SILVER	0.58	n > 62 days	Medium
PSEI / PLATINUM	0.69	n > 62 days	Strong
SET / KOSPI	0.88	n > 64 days	Strong
SET / GOLD	0.51	n > 54 days	Medium
SET / SILVER	0.65	n > 56 days	Medium
SET / PLATINUM	0.77	n > 64 days	Strong
KOSPI / GOLD	0.45	n > 50 days	Medium
KOSPI / SILVER	0.71	n > 64 days	Strong
KOSPI / PLATINUM	0.81	n > 60 days	Strong
GOLD / SILVER	0.76	n > 43 days	Strong
GOLD / PLATINUM	0.66	n > 45 days	Strong
SILVER / PLATINUM	0.89	n > 52 days	Strong

Source: Own elaboration.

CONCLUSION

The general conclusion to be withheld and sustained in the results obtained, through tests carried out with econophysical models, show that the global pandemic had a significant impact in the memory properties of Asian financial markets. The ρ_{DCCA} results show that Platinum is not a safe haven for portfolio rebalancing in these regional markets and that Silver fails to work as a safe haven for the Malaysian (KLSE) and South Korea (KOSPI) markets. Gold, on the other hand, does not show strong ρ_{DCCA} what could indicate that this market could represent a safe haven for these Asian regional markets, during the period of 2020 crisis. We also found that the trendless cross-correlation coefficients between the Gold, Platinum, and Silver markets show strong ρ_{DCCA} , which may jeopardize the hypothesis of portfolio diversification. The exponents *Detrended Fluctuation Analysis (DFA)* show accentuated long memories, with the exception made to the Gold market that shows signs of balance, which is a result aligned with the second question of investigation is validated. These results show that price changes are not i.i.d.. This situation has implications for investors, as some prices could be predicted, creating opportunities for arbitrage and abnormal returns. These findings are relevant for market regulators in order to take measures to ensure better information among international financial markets. In conclusion, we believe that investors should diversify their portfolios, and invest in less risky markets, with the purpose of mitigating risk and improving the efficiency of their portfolios.

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Table 6. DFA exponent for index and return. The values of the linear adjustments for α DFA always had $R^2 > 0.99$.

Stock market	DFA exponent (Covid period)
SHCOMP	0.57 \cong 0.0045
Hsi	0.57 \cong 0.0004
KLSE	0.67 \cong 0.0007
TRX SGP	0.69 \cong 0.0049
TRX IDP	0.64 \cong 0.0036
JPNK 400	0.65 \cong 0.0018
PSEi	0.69 \cong 0.0023
Set	0.65 \cong 0.0098
KOSPI	0.63 \cong 0.0005
Gold	0.47 \cong 0.0177
Silver	0.55 \cong 0.0084
Platinum	0.57 \cong 0.0075

Note: The hypotheses are $H_0 : \alpha = 0.5$ and $H_1 : \alpha \neq 0.5$.
Source: Own elaboration.

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Chapter 17

Testing the Random Walk Hypothesis for Real Exchange Rates

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ABSTRACT

This chapter aims to analyze the efficiency, in its weak form, in the exchange rates of Brazil vs. USA, Australia, Canada, Europe (Euro Zone), Switzerland, United Kingdom, and Japan from July 1, 2019 to September 20, 2020. The results suggest that exchange rates show signs of (in)efficiency, in their weak form (i.e., the values of the variance ratios are lower than the unit), which implies that returns are autocorrelated over time, and there is reversal to the average. In corroboration, the results of detrended fluctuation analysis (DFA) show persistence in yields (i.e., the existence of long memories), thus validating the results of the Lo and Mackinlay model that show autocorrelation between the series of yields. As a conclusion, the authors show that the assumption of market efficiency may be questioned, since the forecast of market movement may be improved if the lagged movements of the other markets are taken into account, allowing the occurrence of arbitrage operations in these foreign exchange markets.

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INTRODUCTION

Coronavirus Covid-19 is a type of outbreak that first appeared in December 2019 in Wuhan City, Hubei Province, China. It was declared a pandemic by the World Health Organization (WHO) on March 12, 2020. According to the WHO, since the beginning of the pandemic the number of Covid-19 infected persons has already surpassed 55.6 million (confirmed cases) and 1.3 million deaths worldwide in November 2020 (AlAli, 2020; Liu, Manzoor, Wang, Zhang, and Manzoor, 2020).

The easy spread of this virus has caused uncertainty in the global population. This epidemic has also changed people's lifestyles; it has caused job losses and threatened the livelihoods of millions of people as companies closed to control the spread of the virus. Globally, the rapid spread of Covid-19 has had devastating impacts on the global economy, and consequently on financial markets around the world (Zhang, Hu, and Ji, 2020; Ali, Alam, and Rizvi, 2020).

International financial markets have seen a succession of major setbacks in recent months triggered by Covid-19, followed by a series of collapses, the oil war, and currency fluctuations. Associated with the coronavirus pandemic in 2019-2020, financial markets, particularly stock, bond, foreign exchange and commodities markets have been characterized by high levels of turbulence (Abu Bakar, 2020; Liu, Manzoor, Wang, Zhang, and Manzoor, 2020; Njindan Iyke, 2020).

For instance, the oil price war has been a major cause of crashes in international financial markets in 2020. In the first weeks of March, oil prices in the United States fell 34%, crude oil fell 26% and Brent oil fell 24%. These events were triggered by a disruption in the dialogue between the Organization of the Petroleum Exporting Countries (OPEC) and Russia on the proposed cuts in oil production due to the Covid-19 pandemic, with Russia with going the agreement, leading to the fall of the OPEC alliance. The price of oil had already fallen 30% since the beginning of that year due to the drop in demand. Saudi Arabia began a price war with Russia, leading to a quarterly drop of 65% in the price of crude oil. (Sharif, Aloui, and Yarovaya, 2020; Villarreal-Samaniego, 2020; Sudha, Sornaganesh and Sathish, 2020).

A market is informationally efficient when all relevant information is reflected in the price system. The lack of consensus among economists and financial analysts regarding market efficiency requires the study of the efficient market hypothesis (EMH). Another significant reason to study market efficiency is the role of financial markets acting as intermediaries between savers and borrowers in the distribution of scarce resources via the price mechanism (Jain, 2020; Karasiński, 2020).

According to Huang and Zhang (2019) the wealth that an entity has is usually composed of several assets denominated in different currencies, the value of which depends on the fluctuation of exchange rates. The analysis of the dynamics associated with exchange rates is one of the important concerns for market strategists, risk managers, particularly the impact of currency shocks on the real value of assets.

Informed speculation contributes to the price discovery process and efforts to reduce this speculation significantly reduces the informational efficiency in foreign exchange markets. This research intends to test the efficiency, in its weak form, of the exchange rates of Brazil vs USA, Australia, Canada, Europe (Eurozone), Switzerland, UK and Japan, namely the pairs BRL/USD, BRL/AUD, BRL/CAD, BRL/EUR, BRL/CHF, BRL/GBP, BRL/JPY, in the period from July 1, 2019 to September 20, 2020. To perform this analysis, different approaches were undertaken to assess the impact of the global pandemic on the efficiency of Brazil's foreign exchange markets. The results suggest that the global pandemic had harmful effects on the memory properties of Brazil's exchange rates, i.e., random walk hypotheses are rejected in all markets. These findings show the existence of accentuated arbitrage levels, but the object of this study was not to analyze anomalous profitability without incurring additional risk.

This research adds relevant contributions to the literature. The most relevant contribution is related to the study of the reversal to the average in the Brazilian foreign exchange markets, aiming to understand the different predictability among them, in the context of the global pandemic (Covid-19). Palma and Sartoris (2016) analyzed the reversal to the average in the Brazil exchange markets, testing the random walk and, efficient market hypotheses, in its weak form, however the research questions, the methodology, and the sampling period were essentially different from that followed here.

This chapter is organized in 5 sections. Section 2 presents a literature review regarding the random walk hypothesis in international foreign exchange markets. Section 3 describes the methodology and data. Section 4 contains the results and Section 5 concludes.

LITERATURE REVIEW

Gibson presented the first concept of market efficiency. The author argued that stock prices had all the relevant information. Later, the French mathematician Bachelier (1900), found that asset prices fluctuated randomly, that is, they were independent of previous fluctuations, thus formulating the hypothesis of random *walk* (Fama, 1965a, 1965b, 1970).

According to Fama (1965a) an efficient market is constituted by a group of rational agents that competes for the prediction of asset prices. Assuming that all relevant information is already available to all market players, i.e. the arrival of new information is quickly reflected into prices, thus preventing agents from being able to predict their fluctuations and thus to obtain abnormal returns without incurring into additional risk. In sum an efficient market is one in which prices reflect in full all available information (Fama, 1970).

Wang, Xie, and Han (2012) examine the efficient market hypothesis (EMH) in the foreign exchange markets (Forex), dividing 17 daily exchange rates in the period from 1984 to 2011 and incorporating two global events: the Southeast Asian currency crisis and the subprime crisis in 2008. The authors show that developed foreign exchange markets are more efficient than emerging foreign exchange markets, and that the financial crisis promoted market efficiency significantly, especially in emerging markets such as China, Hong Kong, Korea, and African markets. Lazur, Todea, and Filip (2012) show that the 2008 financial crisis significantly affected the efficiency of foreign exchange markets. The authors show that the foreign exchange markets of the Turkish lira, Russian ruble, Czech krone, Romanian leu, Polish zloty and Hungarian forint, show signs of inefficiency during the second half of 2008 and the first months of 2009.

Sheefeni and Mabakeng (2014), Palma and Sartoris (2016), Olufemi et al. (2017), test the random walk hypothesis in several foreign exchange markets. Sheefeni and Mabakeng (2014) studied the weak efficiency, in the Namibian foreign exchange market using three bilateral exchange rates. The authors suggest the existence of efficiency in Namibia's foreign exchange market, in the sense that past values cannot be used to predict current values. Palma and Sartoris (2016) examine the Brazilian foreign exchange market, evidencing that the random walk hypothesis is rejected, proving that in this market there is some degree of predictability. Olufemi et al. (2017) show that the foreign exchange markets of 10 sub-Saharan African countries against the US dollar show signs of inefficiency, i.e., investors are able to achieve abnormal returns without incurring additional risk.

Mohammadpoor and Rezazadeh (2019), Njindan Iyke (2019), Chaudhry et al. (2019) examine the predictability of foreign exchange markets by testing the efficient market hypothesis. Mohammadpoor

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and Rezazadeh (2019) test weak efficiency in the foreign exchange and gold markets in Iran, evidencing that the main source of market inefficiency is government interference in the market. Njindan Iyke (2019) tested whether Indonesia's foreign exchange market is efficient, and shows that the efficient market hypothesis is rejected in 50% of cases. Chaudhry et al. (2019) show that the exchange rates of Pakistan, namely with respect to the Japanese yen (JPY/PKR), Swiss Franc (CHF/PKR), British Pound (GBP/PKR), US Dollar (USD/PKR) pairs, show signs of inefficiency, i.e., investors are able to adjust the trades with the necessary lags for the purpose of obtaining abnormal returns.

In summary, this work aims to contribute to the provision of information to investors and regulators in the international exchange markets, where individual and institutional investors seek to efficiently diversify their portfolios, in a period of uncertainty and lack of confidence arising from the global pandemic (Covid-19).

DATA AND METHODOLOGY

The data analyzed are the daily exchange rates of Brazil vs USA, Australia, Canada, Europe (Eurozone), Switzerland, UK and Japan, namely the pairs BRL/USD, BRL/AUD, BRL/CAD, BRL/EUR, BRL/CHF, BRL/GBP, BRL/JPY, in the period from July 1, 2019 to September 20, 2020. Data was obtained from the DataStream platform.

Table 1. Exchange rates under analysis

Country	Exchange Rate
Real / US Dollar	BRL/USD
Real / Australian Dollar	BRL/AUD
Real / Canada Dollar	BRL/CAD
Real / Europe (Eurozone)	BRL/EUR
Real / Swiss Franc	BRL/CHF
Real / Pound Sterling	BRL/GBP
Real / Yen of Japan	BRL/JPY

Source: Own elaboration

Methodology

The development of the research will take place through several stages. We used charts, at price levels and in returns, to demonstrate the evolution of the foreign exchange markets under analysis. The sample will be characterized by descriptive statistics to verify that the data follow a normal distribution. To ensure that time series follow a white noise (mean = 0; constant variance), we will use the unit root tests panel in Dickey and Fuller (1981), Perron and Phillips (1988), Levin, Lin, and Chu (2002) that postulate the same null hypotheses. To identify the structural breaks, we used the test of Clemente et al (1998). In order to answer the research questions, we used the variance ratio methodology proposed by Lo and Mackinlay (1988), with the purpose of evaluating the autocorrelation between the series of returns. Such

methodology can be classified as a parametric test. The efficient market hypothesis in its weak form establishes that it is not possible to predict future prices based on historical prices. The author Rosenthal (1983) advocates whether a market is efficient in its weak form, then there should be no linear dependence between the returns located both in the statistical sense (absence of autocorrelation) and in the economic sense (no positive returns after considering transaction costs). The Lo and Mackinlay model (1988) defines how the P_t price of an asset in t and X_t as the natural logarithm of P_t . the random walk hypothesis is given by:

$$X_t = \mu + X_{t-1} + \epsilon_t. \quad [1]$$

Where μ is an arbitrary motion parameter and ϵ_t is the random error term. The authors show that an important characteristic of the random walk process is that the variance of increments increases linearly according to the observation interval. That is, the variance of $X_t - X_{t-2}$ is twice the variance of $X_t - X_{t-1}$. Thus, the validity of a random walk model can be tested by comparing returns variance estimators at different frequencies. For example, the variance of the series of weekly returns should be five times greater than the variance of the daily returns. The model consists of testing whether the ratio of variance to different intervals weighted by their duration is equal to one.

The variance of a series q - differentiated ($X_t - X_{t-q}$) will be q times the variance of the series of the first differentiation ($X_t - X_{t-1}$). The variance ratio test is done according to the consistent estimator to heteroscedasticity defined by Lo and Mackinlay (1988). In a sample with $nq + 1$ observations, where q is an integer greater than 1, the following estimators are defined:

$$\bar{X} \equiv \frac{1}{nq} \sum_{k=1}^{nq} (X_k - X_{k-1}) = \frac{1}{nq} (X_{nq} - X_0). \quad [2]$$

$$\bar{A}_a^2 \equiv \frac{1}{nq} \sum_{k=1}^{nq} (X_k - X_{k-1} - \bar{X})^2. \quad [3]$$

$$\bar{A}_c^2(q) \equiv \frac{1}{m} \sum_{k=1}^n (X_{qk} - X_{qk-q} - q\bar{X})^2. \quad [4]$$

Where:

$$m = q(nq - q + 1) \left(1 - \frac{q}{nq} \right). \quad [5]$$

The ratio of variance is given by:

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Table 2. Detrended Fluctuation Analysis (DFA)

Exponent	Type of Signal
$\pm_{\text{DFA}} < 0.5$	anti-persistent long-range
$\pm_{\text{DFA}} 0.5$	uncorrelated, white noise
$\pm_{\text{DFA}} > 0.5$	persistent long-range

Source: Own elaboration.

$$\widehat{VR}(q) = \frac{\tilde{A}_c^2(q)}{\tilde{A}_a^2(q)}. \quad [6]$$

Robust test statistics to heteroscedasticity are defined by:

$$z^*(q) = \frac{\sqrt{nq}(\widehat{VR}(q) - 1)}{\sqrt{\phi(q)}}. \quad [7]$$

Where:

$$\phi(q) = \sum_{j=1}^{q-1} \left[\frac{2(q-j)}{q} \right]^2 \mathcal{A}(j). \quad [8]$$

$$\mathcal{A}(j) = \frac{\sum_{t=j+1}^{nq} (X_t - X_{t-1} - \mu)^2 (X_{t-j} - X_{t-j-1} - \mu)^2}{\sum_{t=j+1}^{nq} (X_t - X_{t-1} - \mu)^2}. \quad [9]$$

To validate the results of the random walk hypothesis we will use the *Detrended Fluctuation Analysis (DFA)*. DFA is an analysis method that examines temporal dependence on non-stationary data series. This technique assumes that time series are non-stationary avoids spurious results when the analysis focuses on the relationships of data series in the long term (Bashir, Yu, Hussain, and Zebende, 2016; Dias, da Silva, and Dionísio, 2019).

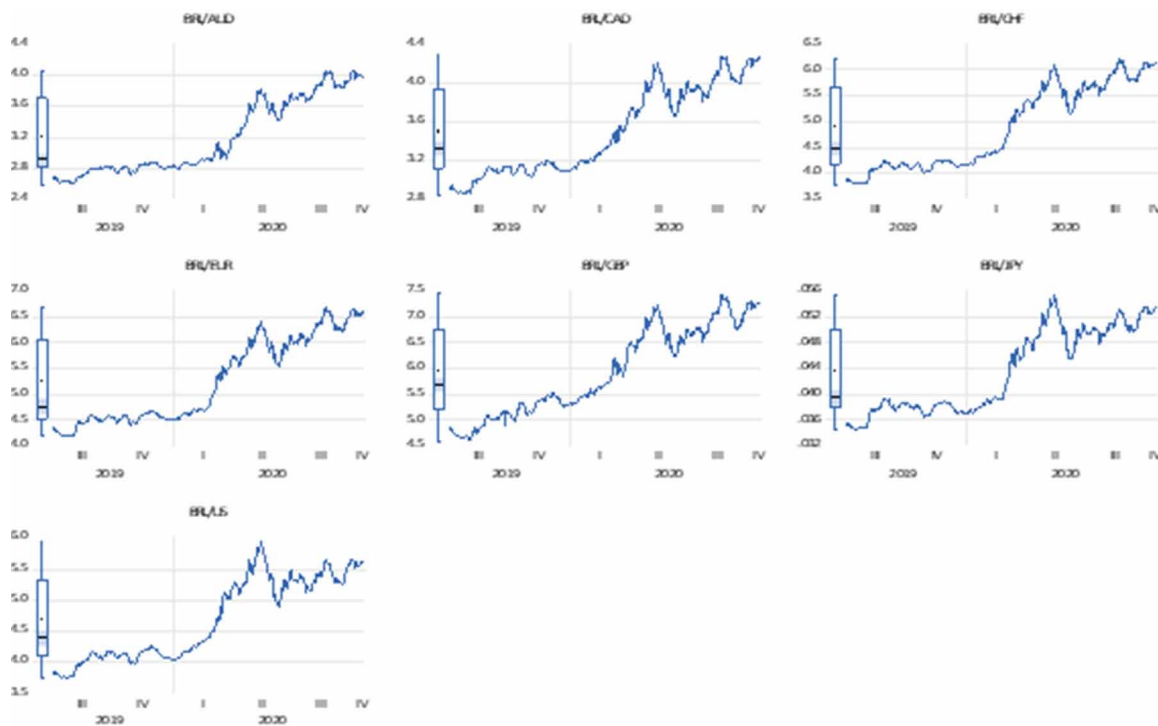
The *Detrended Fluctuation Analysis (DFA)* presents the following interpretation:

RESULTS

Figure 1 shows the evolution of exchange rates, at levels, in the period from July 1, 2019 to October 20, 2020, and we can see the existence of volatility in exchange rates due to uncertainty and pessimism experienced in international financial markets due to the global pandemic of 2020 (Covid-19).

Figure 1. Evolution, in levels, of the 7 foreign exchange markets, in the period from July 1, 2019 to October 20, 2020

Source: Own elaboration.



In figure 2 we can measure the evolution, in returns, of the 7 rates of exchange. The graphic analysis allows us to evidence that these present very similar patterns of behavior during the sampling period, and that these patterns were strongly marked by the occurrence of the global pandemic (Covid-19). On the other hand, the graphic analysis also allows verifying the existence of a *bear market period* between February, March and April 2020, characterized by a sharp drop due to the evolution of the global pandemic (Covid-19).

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Figure 2. Evolution in returns in the 7 foreign exchange markets from July 1, 2019 to October 20, 2020
Source: Own elaboration.

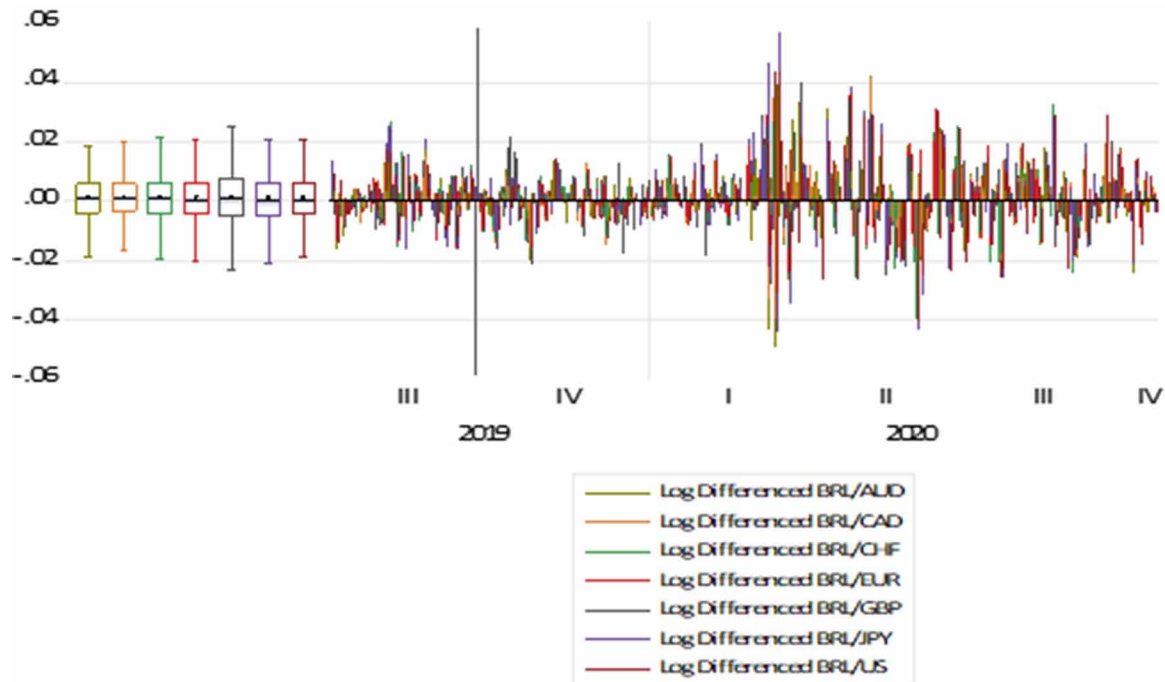


Figure 3 shows the averages for real exchange rates (BRL) vs US dollar, Australian dollar, Canadian dollar, pound sterling, Swiss franc, and Japanese yen. Exchange rates BRL/AUD (0.001173), BRL/CAD (0.001113), BRL/CHF (0.001358), BRL/EUR (0.001242), BRL/GBP (0.001201), BRL/JPY (0.001204), BRL/US (0.001120) show positive average daily returns.

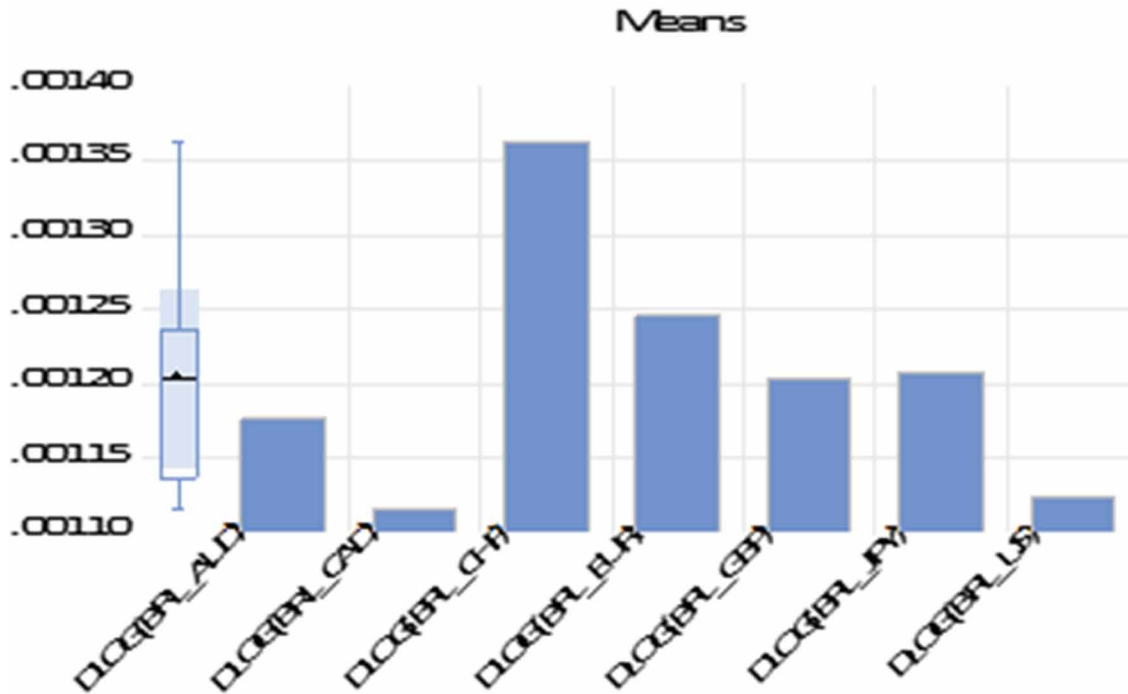
Figure 4 shows the standard deviations related to the 7 financial markets under analysis. The Brazil vs Japan exchange rate, BRL/JPY (0.012160), is the exchange rate with the most marked standard deviation. The exchange rates BRL/GBP (0.011651), BRL/CHF (0.011060), BRL/US (0.010840), BRL/EUR (0.010499), BRL/AUD (0.010282) and BRL/CAD (0.010007) have less pronounced standard deviations.

Figure 5 shows the Skewness of the 7 financial markets under analysis and we can verify that the exchange rates Brazil vs Australia BRL/AUD (-0.102416), Brazil vs. United Kingdom, BRL/GBP (-0.059644) show negative asymmetries. The pairs BRL/JPY (0.360052), BRL/EUR (0.322366), BRL/US (0.265791), BRL/CHF (0.247331), BRL/CAD (0.080683) present positive asymmetries. These results indicate that the time series relating to exchange rates do not follow a normal distribution (Skewness = 0).

Figure 6 shows the Kurtoses of the 7 financial markets under analysis of real exchange rates (BRL) vs US dollar, Australian dollar, Canadian dollar, pound sterling, Swiss franc, and Japanese yen. The Brazil vs Australia exchange rate, BRL/AUD (7.048413) presents the sharpest shorthand. In addition, we can see that brazil vs United Kingdom exchange rates BRL/GBP (6.959999), Brazil vs Canada, BRL/CAD (6.364627), Brazil vs Japan BRL/JPY (5.878083), Brazil vs. USA, BRL/US (5.250286), Brazil vs Switzerland, BRL/CHF (5.099877), Brazil vs Eurozone Euro (Europe), BRL/EUR (5.004986), present less marked shorts values. These results validate that time series do not follow a normal distribution, because asymmetry and short sections are different from reference values (Skewness = 0; Kurtoses = 3).

Figure 3. Averages returns of the 7 foreign exchange markets, in the period from July 1, 2019 to October 20, 2020

Source: Own elaboration.



In table 3 we can see the results of the Jarque-Bera test that validate the results of asymmetry and kurtosis, that is, we are faced with data series that do not follow a normal distribution, since the null hypothesis is rejected at a significance of 1%.

As we are estimating time series, we should examine the stationary nature of the data series of the 7 exchange markets under analysis. Dickey and Fuller (1981) Perron and Phillips (1988), Levin, Lin, and Chu (2002) tests have as null hypothesis that all panels contain a unit root, and we found that the intersection of the tests show the stationarity of the time series (view table 4).

Figure 7 shows the results of unit root tests with structure breaks by Clemente et al. (1998) and we easily found that the exchange rates had structural breaks in May and June 2020, with the exception of the BRL/GBP pair that broke on September 23, 2019. These results are validated by the authors Abu Bakar (2020), Liu, Manzoor, Wang, Zhang, and Manzoor (2020), Njindan Iyke (2020) who show that the global crisis of 2020 (Covid-19) has serious repercussions on financial markets, particularly in the stock, securities, foreign exchange and commodity markets

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Figure 4. Standard deviations of returns of the 7 foreign exchange markets, in the period from July 1, 2019 to October 20, 2020

Source: Own elaboration.

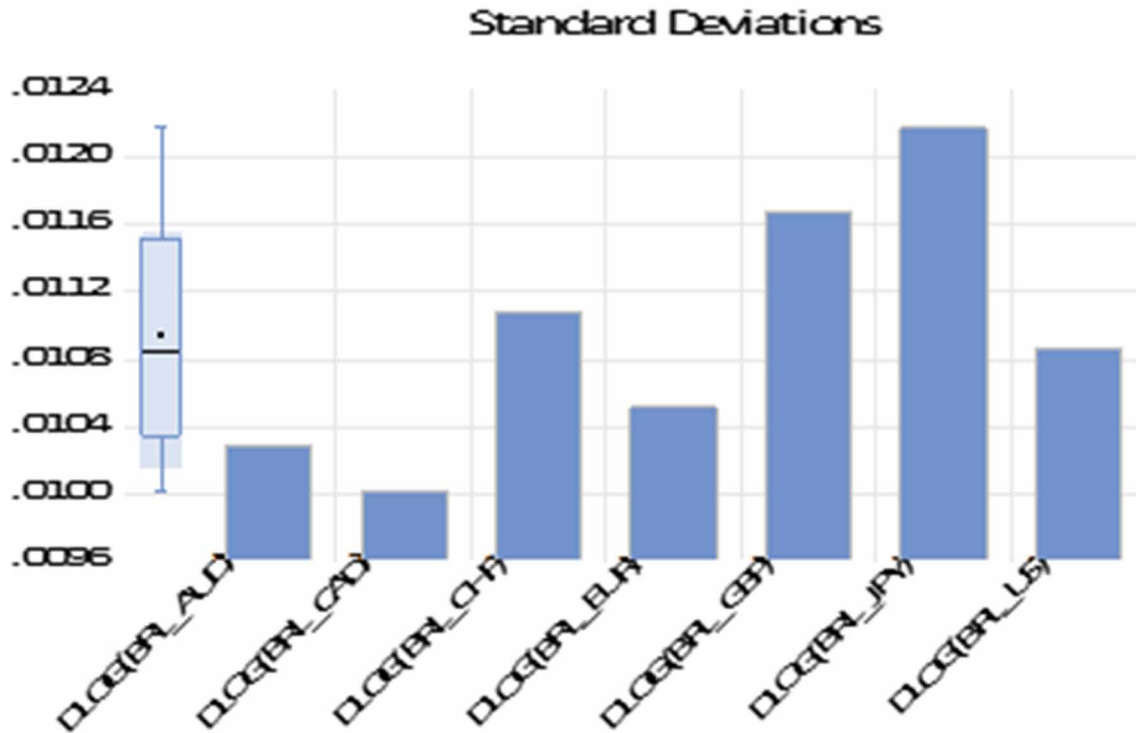


Table 5 presents the results of the variance ratio methodology proposed by Lo and Mackinlay (1988), with the purpose of evaluating the autocorrelation between the series of returns. In both cases, statistics were calculated for 2, 4, 8 and 16 days. Considering the results of the variance test, the random walk hypothesis is rejected in all exchange rates. The results therefore support the conclusion that the random walk hypothesis is not supported by the financial markets analyzed in this period of global pandemic. The values of variance ratios are lower than the unit, which implies that the returns are autocorrelated in time and, there is reversal to the mean. In these conditions, markets tend to overreact to information, eventually correcting in the following days, whether it is good news or bad news. The high sensitivity of prices to the arrival of new information will be due to the climate of pessimism and uncertainty experienced by investors during the sampling period under study. These results are corroborated by the studies of authors Mohammadpoor and Rezazadeh (2019), Njindan Iyke (2019), Chaudhry et al. (2019) which show the presence of persistence in exchange rate returns, suggesting that investors will be able to adjust trades with the necessary lags for the purpose of obtaining abnormal returns, without incurring additional risk.

Figure 5. Skewness of returns of the 7 foreign exchange markets, in the period from July 1, 2019 to October 20, 2020
 Source: Own elaboration.

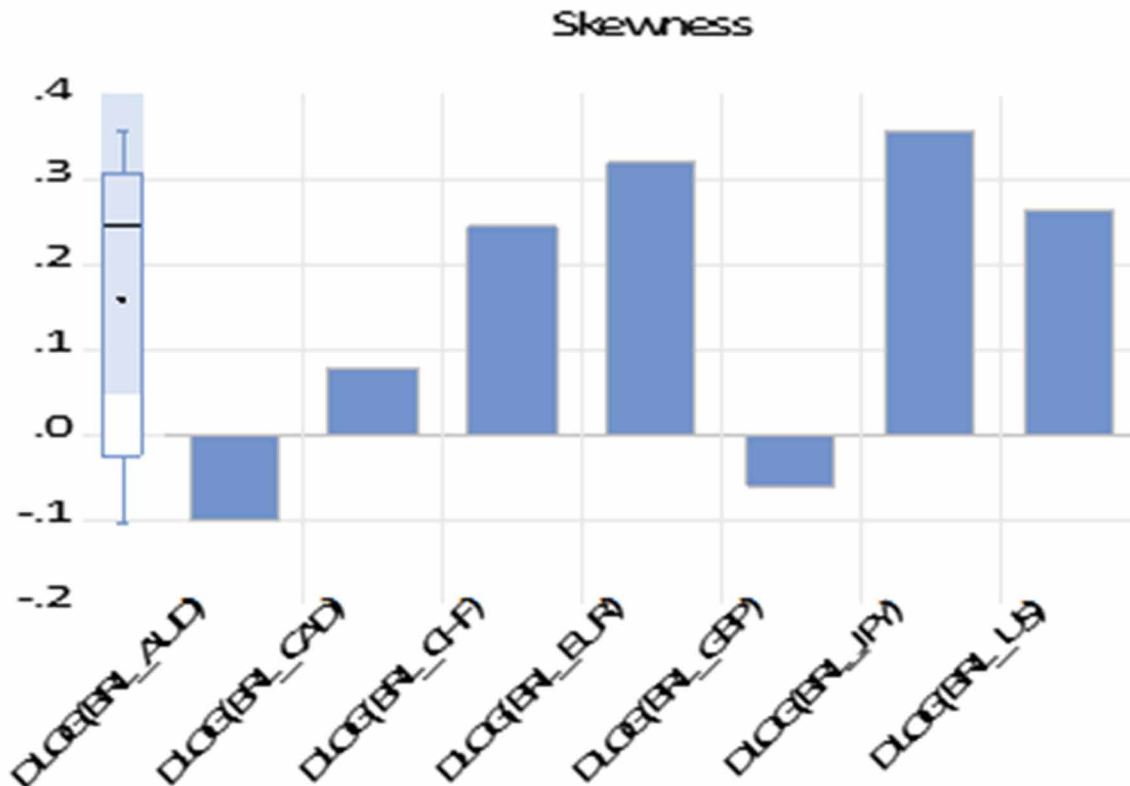


Table 6 shows the results of the *exponents Detrended Fluctuation Analysis (DFA)*, where we found that the financial markets show signs of (in) efficiency, in its weak form, showing persistence in returns, that is, the existence of long memories, validating the results of the Lo and Mackinlay model (1988), which show autocorrelation between the series of returns. These findings show that prices do not fully reflect the information available and that price changes are not i.i.d., in all foreign exchange markets. This situation has implications for investors, since some returns could be expected, creating opportunities for arbitrage and abnormal profitability, contrary to the assumptions of *random walk* and informational efficiency.

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Figure 6. Kurtoses of returns for the 7 foreign exchange markets, in the period from July 1, 2019 to October 20, 2020

Source: Own elaboration.

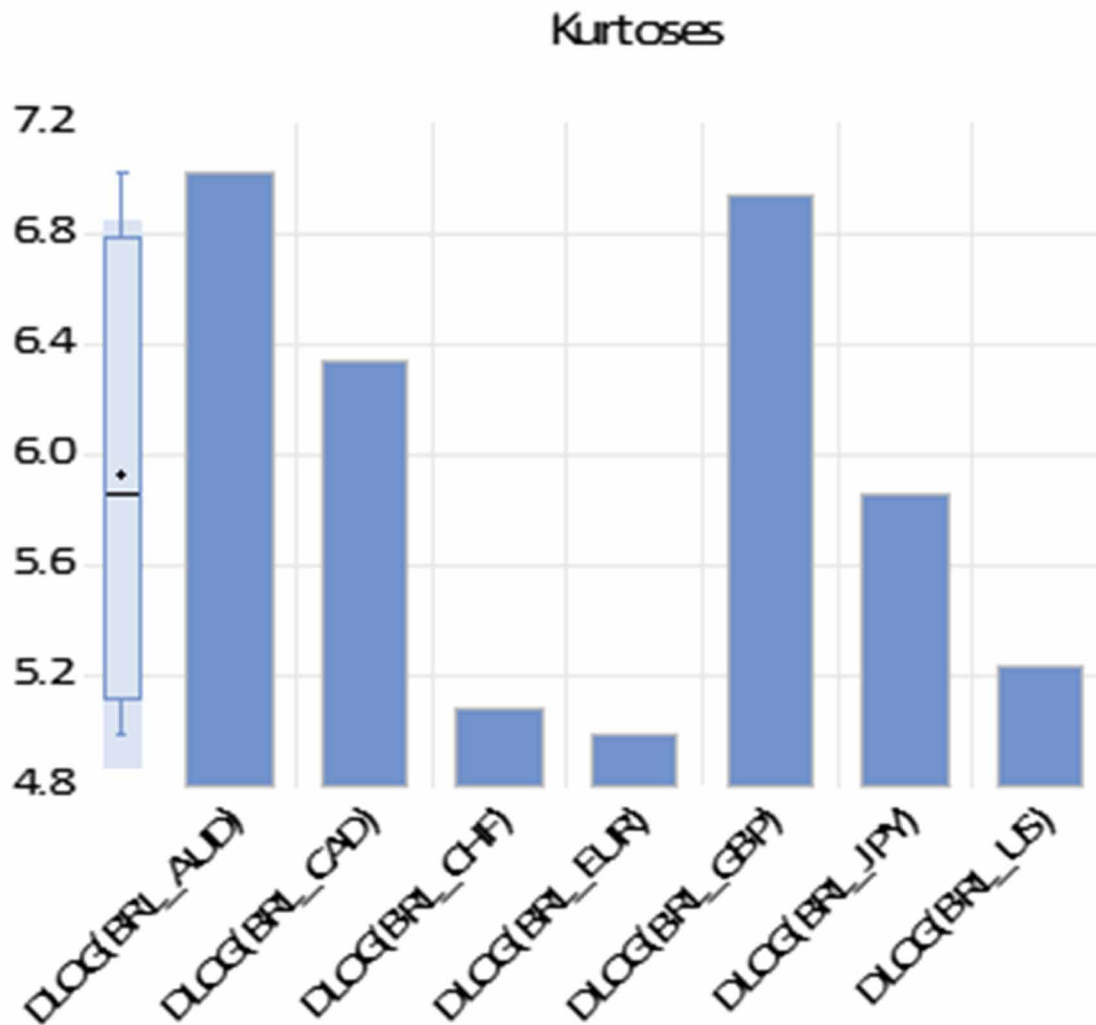


Table 3. Jarque-Bera test for the 7 foreign exchange markets from July 1, 2019 to October 20, 2020

	BRL/AUD	BRL/CAD	BRL/CHF	BRL/EUR	BRL/GBP	BRL/JPY	BRL/US
Jarque-Bera	234.1504***	161.6912***	66.32201***	63.20800***	223.6655***	125.4272***	76.18575***
Observations	342	342	342	342	342	342	342

Note: ***, **, * show the significance at 1%, 5%, 10% levels, respectively.

Source: Own elaboration.

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Table 4. Panel unit root tests applied to the 7 exchange markets from July 1, 2019 to October 20, 2020

Method	Statistic	Prob.***	Cross-sections	Note
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-56.5934***	0.0000	7	2387
Null: Unit root (assumes individual unit root process)				
ADF - Fisher Chi-square	1019.29***	0.0000	7	2387
PP - Fisher Chi-square	1020.03***	0.0000	7	2387

Note: ***, **, * show the meanness at 1%, 5%, 10%, respectively.

Source: Own elaboration.

CONCLUSION

This chapter analyzed the efficiency, in its weak form, of the exchange rates of Brazil vs USA, Australia, Canada, Europe (Eurozone), Switzerland, UK and Japan, namely the pairs BRL/US, BRL/AUD, BRL/CAD, BRL/EUR, BRL/CHF, BRL/GBP, BRL/JPY, in the period from July 1, 2019 to September 20, 2020. To perform this analysis, different approaches were undertaken to assess whether: (i) the global pandemic promoted in (efficiency) in Brazil's foreign exchange markets?

In order to answer the research question, we used the variance ratio methodology proposed by Lo and Mackinlay (1988) in order to evaluate the autocorrelation between the series of returns. In order to corroborate the results, we used the *Detrended Fluctuation Analysis (DFA)* to evaluate temporal dependence in non-stationary data series. In the first test we evaluated the autocorrelation between the series of returns, with the lags of 2, 4, 8, and 16 days, the results of the variance test show that the random walk hypothesis is rejected. In view of these findings, the evidence to be held is that the hypothesis of random walk is not supported by the financial markets analyzed in this period of global pandemic. The values of variance ratios are lower than the unit, which implies that the returns are autocorrelated in time and, there is reversal to the mean. The *Detrended Fluctuation Analysis (DFA)* exponents, show the existence of long memories validating the results of the Lo and Mackinlay model (1988), which show autocorrelation between the series of returns. These findings show that prices do not fully reflect the information available and that price changes are not i.i.d., in all foreign exchange markets.

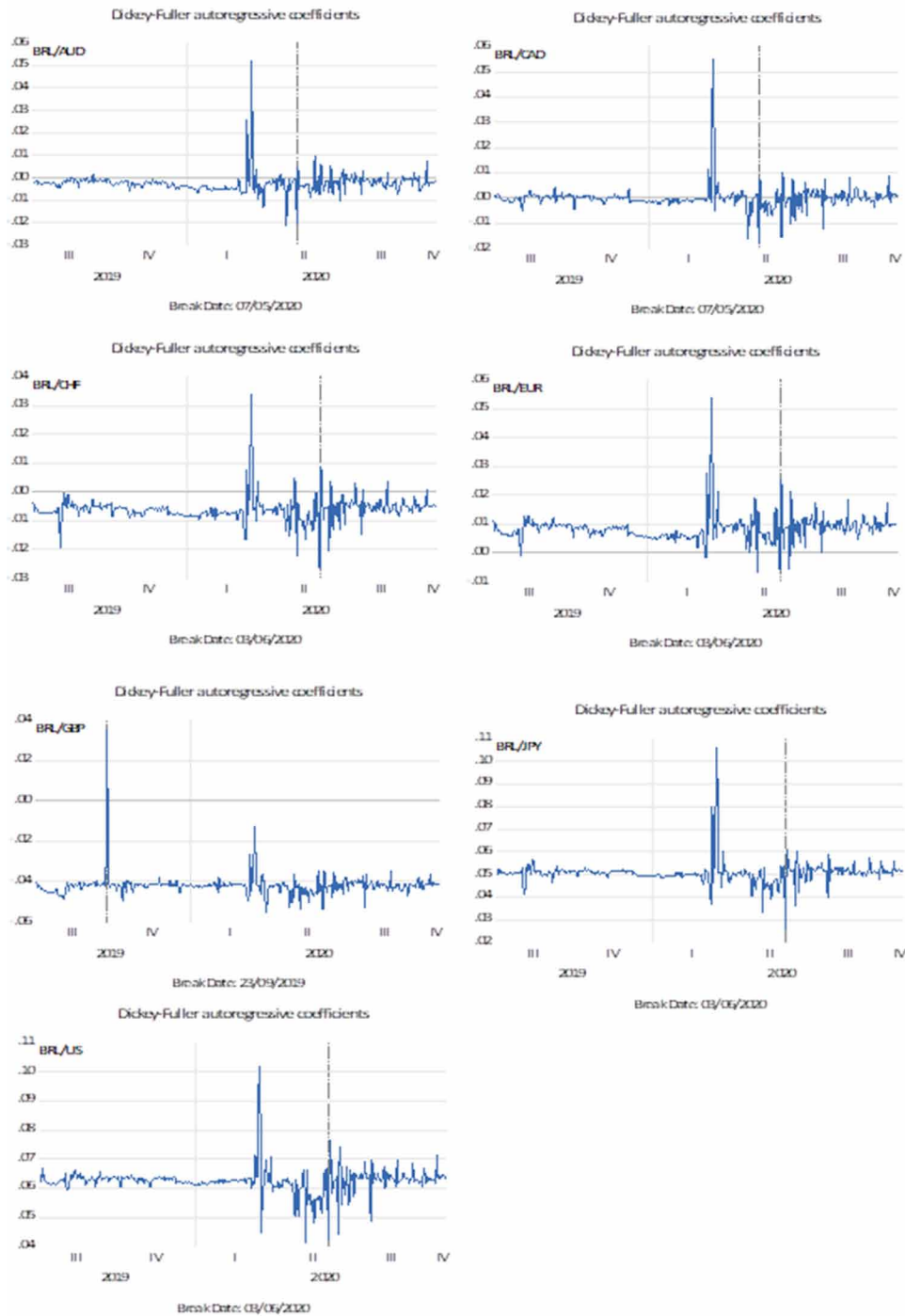
The general conclusion to be withheld and sustained in the results obtained, through the tests performed with econometric and mathematical models suggest that these exchange markets show that the ratios of variances are lower than the unit, which implies that the returns are autocorrelated in time and, there is reversal to the mean. In corroboration, through the *DFA* model, we found that the exchange markets analyzed show signs of (in) market efficiency, in its weak form, evidencing that the past time series can transmit a predictability pattern in the current time series. In conclusion, markets tend to overreact to information, eventually correcting in the following days, whether it is good news or bad news. The high price sensitivity to the arrival of new information will be due to the climate of pessimism and uncertainty experienced by investors due to the global pandemic of 2020.

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Figure 7. Graphs of the structural breaks by Clemente et al. (1998), in returns, applied to the 7 foreign exchange markets, in the period from July 1, 2019 to October 20, 2020

Note: Lag Length (Automatic Length based on SIC). Break Selection: Minimize Dickey-Fuller t-statistic.

Source: Own elaboration.



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Table 5. Tests of Variance Ratios, in returns, for the 7 foreign exchange markets, in the period from July 1, 2019 to October 20, 2020

Null Hypothesis: BRL_US is a random walk (Variance Ratio)				
Joint Tests		Value	df	p-value
Max lzI (at period 2)		7.991620	341	0.0000
Wald (Chi-Square)		64.03641	4	0.0000
Individual Tests				
Period	Var. Ratio	Std. Error	z-Statistic	p-value
2	0.567230	0.054153	-7.991620	0.0000
4	0.357325	0.101311	-6.343584	0.0000
8	0.222581	0.160187	-4.853199	0.0000
16	0.144568	0.238366	-3.588738	0.0010
Null Hypothesis: BRL_AUD is a random walk (Variance Ratio)				
Joint Tests		Value	df	p-value
Max lzI (at period 2)		7.745432	341	0.0000
Wald (Chi-Square)		60.24953	4	0.0000
Individual Tests				
Period	Var. Ratio	Std. Error	z-Statistic	p-value
2	0.580561	0.054153	-7.745432	0.0000
4	0.346727	0.101311	-6.448188	0.0000
8	0.200671	0.160187	-4.989978	0.0000
16	0.125087	0.238366	-3.670467	0.0010
Null Hypothesis: BRL_CAD is a random walk (Variance Ratio)				
Joint Tests		Value	df	p-value
Max lzI (at period 2)		7.768256	341	0.0000
Wald (Chi-Square)		60.67159	4	0.0000
Individual Tests				
Period	Var. Ratio	Std. Error	z-Statistic	p-value
2	0.579325	0.054153	-7.768256	0.0000
4	0.347856	0.101311	-6.437049	0.0000
8	0.194304	0.160187	-5.029727	0.0000
16	0.121925	0.238366	-3.683732	0.0000
Max lzI (at period 2)		8.561142	341	0.0000
Wald (Chi-Square)		73.39563	4	0.0000
Individual Tests				
Period	Var. Ratio	Std. Error	z-Statistic	p-value
2	0.536388	0.054153	-8.561142	0.0000
4	0.317537	0.101311	-6.736316	0.0000
8	0.192230	0.160187	-5.042672	0.0000
16	0.126671	0.238366	-3.663821	0.0020
Null Hypothesis: BRL_EUR is a random walk (Variance Ratio)				
Joint Tests		Value	df	p-value
Max lzI (at period 2)		8.350085	341	0.0000
Wald (Chi-Square)		70.16147	4	0.0000
Individual Tests				
Period	Var. Ratio	Std. Error	z-Statistic	p-value
2	0.547818	0.054153	-8.350085	0.0000
4	0.339240	0.101311	-6.522091	0.0000
8	0.195696	0.160187	-5.021039	0.0000
16	0.135679	0.238366	-3.626032	0.0000
Null Hypothesis: BRL_CHF is a random walk (Variance Ratio)				
Joint Tests		Value	df	p-value
Max lzI (at period 2)		7.962167	341	0.0000
Wald (Chi-Square)		63.73041	4	0.0000
Individual Tests				
Period	Var. Ratio	Std. Error	z-Statistic	p-value
2	0.568824	0.054153	-7.962167	0.0000
4	0.342617	0.101311	-6.488756	0.0000
8	0.186474	0.160187	-5.078608	0.0000
16	0.114046	0.238366	-3.716785	0.0010

continued on following page

Testing the Random Walk Hypothesis for Real Exchange Rates

Table 5. Continued

Null Hypothesis: BRL_JPY is a random walk (Variance Ratio)				
Joint Tests		Value	df	p-value
Max z (at period 2)		7.850431	341	0.0000
Wald (Chi-Square)		61.78997	4	0.0000
Individual Tests				
Period	Var. Ratio	Std. Error	z-Statistic	p-value
2	0.574875	0.054153	-7.850431	0.0000
4	0.342551	0.101311	-6.489406	0.0000
8	0.204314	0.160187	-4.967237	0.0000
16	0.131211	0.238366	-3.644773	0.0000

Source: Own elaboration.

Table 6. DFA exponent for return (The values of the linear adjustments for α DFA always had $R^2 > 0.99$)

Country	Index	Exponent DFA (Covid-19)
Real / US Dollar	BRL / USD	0.61 \cong 0.0048
Real / Australian Dollar	BRL / AUD	0.54 \cong 0.0022
Real / Canada Dollar	BRL / CAD	0.55 \cong 0.0074
Real / Europe (Eurozone)	BRL / EUR	0.58 \cong 0.0037
Real / Swiss Franc	BRL / CHF	0.59 \cong 0.0048
Real / Pound Sterling	BRL / GBP	0.53 \cong 0.0043
Royal / Yen of Japan	BRL / JPY	0.60 \cong 0.0043

Note: The hypotheses are: $H_0 : \alpha = 0.5$ and: $H_1 : \alpha \neq 0.5$

Source: Own elaboration.

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Chapter 18

The Relationship Between COVID-19 (Cases and Deaths) and Stock Markets: An Analysis to Help in Decision Making

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ABSTRACT

The numbers of COVID-19 increase daily, both confirmed cases and deaths. All over the world, shock waves are felt with impacts on economies in general and the financial sector in particular. Aiming to assess the relationship between confirmed cases and deaths and the behaviour of stock markets, the authors perform a dynamic analysis, based on the Pearson correlation coefficient, for 10 of the most affected countries in the world. As expected, they find evidence that the number of COVID-19 cases had a negative effect on stock markets, and that the current second wave is penalizing them. They also find that deaths have a more relevant impact than the number of confirmed cases.

INTRODUCTION

As at 18th November 2020, COVID-19 has almost reached a total of 56 million confirmed cases all over the world, and already caused more than 1.3 million deaths, in more than 200 countries. The evolution of the pandemic has led to national and supranational authorities issuing recommendations and taking measures to contain the spread of the disease.

The occurrence of epidemics and pandemics is not new in the world, with major examples being the Black Death, Bleeding Fever, Cholera, Spanish Flu, Swine Flu, Ebola or Dengue. COVID-19 is a severe acute respiratory syndrome (SARS), with a zoonotic origin. The occurrence of SARS is not new,

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going back at least to 2003, although at that time it had very reduced effects compared with the present situation. For example, Lee (2003), Nippani and Washer (2004) or Chen, Jang and Kim (2007) reported some effects on business and education activities, while Del Giudice and Paltrinieri (2017) or Ichev and Marinč (2018) show evidence of the impacts on different stock markets, in this case caused by the Ebola outbreak. Jwo, Chen and Yeh (2006), regarding the SARS episode of 2003, conclude that stock market movements in the infected areas were similar to the paths of the transmission of the disease.

COVID-19 has a major impact on many aspects of life, not only health (physical and psychological) but also economic activities, with decisions on confinements and lockdowns creating great uncertainty (Baker, Farrokhnia, Meyer, Pagel & Yannelis, 2020). For example, Aslam, Awan, Syed, Kashif and Parveen (2020) report the effect of COVID-19 on sentiments like fear and uncertainty, which are also spreading all over the world. Economically speaking, each month of the pandemic could have an impact of between 2.5% and 3% on GDP, according to Fernandes (2020), with a direct effect on several areas of the economy, with the respective impact on unemployment. There is concern about increased poverty levels (Lucas, 2020; Sumner, Hoy & Ortiz-Juarez, 2020) and for these reasons, it is crucial to make some policy reforms to help countries recover their economies as a whole (Aslam, Memon & Mughal, 2020; Zhang, Hu & Ji, 2020).

Financial markets have also suffered greatly, as reported in many studies which will be referred to in the following section. Those studies analyze different kinds of markets and assets (stock indices, sectoral shares, commodities or cryptocurrencies, among others). Issues like the contagion effect and the way information is transferred between markets during crisis moments are not new and have already drawn the attention of several authors (see, for example, Lin, Engle & Ito, 1994) as well as the importance of contagion in defining portfolios (Jiang, Fu & Ruan, 2019; Mensi, Hammoudeh & Kang, 2017; Mensi, Boubaker, Al-Yahyaee & Kang, 2018).

Another important issue to be analysed is the possibility of different effects in the first wave of the disease and the second wave, which is currently affecting many countries. This is very important information for decision-makers, who must take measures to lower the infection rate and at the same time mitigate economic and financial losses.

In this chapter we propose to analyse how confirmed cases and deaths had an effect on the stock market returns of 10 countries among the most affected by the disease: Belgium, Brazil, France, Germany, India, Italy, Portugal, Spain, UK and USA. With a sample of data starting at the beginning of March 2020 (when the first cases appeared in those countries) and ending in October 2020 (when data was retrieved), we analyse the evolution of new confirmed cases/deaths and the performance of stock market indices in those countries. We used a correlation coefficient with a sliding windows approach, which allowed us to analyse the evolution of those correlations over time. This approach is innovative once it deals with two different waves of the disease, identifying possible different patterns in both waves.

Despite different results in different countries which could adopt different measures, in general we found that recently the number of cases of COVID-19 has had a relevant effect on stock markets. Contrary to previous studies, we also found that in some countries the evolution of deaths has a higher impact than the evolution of confirmed cases, which is an interesting result as it differs from the findings of Ashraf (2020).

Background

The impact of COVID-19 on economies in general and financial markets in particular has already been analysed. For example, Nicola, Alsafi, Sohrabi, Kerwan, Al-Jabir, Iosifidis, Agha and Aghaf (2020) make a review and identify several sectors affected, such as agriculture, petroleum and oil, manufacturing, education, finance industry, healthcare, pharmaceutical industry, hospitality, tourism and aviation, real estate and housing sector, sports industry, information technology, media or research and development, as well as other social impacts related to family dynamics (from domestic violence to home video-gaming).

Specifically for financial markets, we have also several studies. Baker et al. (2020) conclude that this pandemic had a more severe effect on US stock markets than previous diseases, causing huge losses, as confirmed, for example, by the work of Zhang et al. (2020) already referred to.

A comparative study documented that COVID-19 has had a greater effect on the US stock market than on Asian and Australian stock markets (Ammy-Driss & Garcin, 2020). Somewhat similar findings are confirmed by Garcin, Klein and Laaribi (2020). On the other hand, Topcu and Gulan (2020) find a greater impact on Asian stock markets than on European ones. Yarovaya, Elsayed and Hammoudeh (2020) compare US and Islamic assets and find that the latter seem to be more of a haven during the pandemic. The authors also asserted that spillovers between conventional and Islamic stock markets increased during this period. Considering some Central European countries, Czech, Wielechowski, Kotyza, Benešová and Laputková (2020) confirmed the expected negative effect of COVID-19's evolution on financial markets. Ali, Alam and Rizvi (2020) consider the countries most affected by COVID-19, and studying their behaviour found that the moment of declaring the pandemic had a negative impact on stock markets. The differences in stock markets' structure, namely the degree of development or liquidity, as well as the evolution of the COVID-19 epicentres could lead to these results.

The COVID-19 pandemic has also increased the volatility of stock markets, as stated by Ali et al. (2020) or Barro, Ursua and Weng (2020). This volatility creates uncertainty among investors and could have practical implications for the way stock markets work, namely the deterioration of market stability (Baig, Butt, Haroon & Rizvi, 2020; Chen, Liu & Zhao, 2020). For example, Aslam, Mohti and Ferreira (2020) identify that COVID-19 reduced the efficiency of stock markets in Europe, increasing the possibility of predicting some behavioural patterns. Sentiments like panic among investors could have a high impact on stock market volatility (Haroon & Rizvi, 2020) with investors being more cautious in their activities (Lu & Lai, 2012; Omay & Iren, 2019). This could imply less liquidity in markets, which could affect their performance (Epstein & Wang, 1994; Levy & Galili, 2006). According to Allam, Abdelrhim and Mohamed (2020), this occurred during the COVID-19 outbreak, and the remaining uncertainty, despite some market recovery being noted, could continue to affect financial markets (Mamaysky, 2020; Liu, Manzoor, Wang, Zhang & Manzoor, 2020). Trying to explain the differences of market responses to the COVID-19, Fernandez-Perez, Gilbert, Indriawan, and Nguyen (2020) found that countries with cultural issues like lower individualism or uncertainty avoidance are relevant to explain differences in the way like markets are affected. The authors also found similar results considering the past SARS crisis, in 2003. Using information about the uncertainty of pandemics and epidemics (UPE), and considering emerging stock markets, Salisu, Sikiry and Vo (2020) concluded that those emerging markets are more vulnerable to UPE than developed ones.

Another interesting topic in analysing the effect of COVID-19 is assessment of the connectivity between markets and whether the disease has changed that connectivity. Zhang et al. (2020) use network

analysis and conclude that during the pandemic European rather than US stock markets take the lead. This could be related to the epicenter of the pandemic being first in Europe.

Another field of analysis lies in the possibility of contagion and increased connection between markets caused by the start of COVID-19. In this context, Akhtaruzzaman, Boubaker and Sensoy (2020) study the possible existence of contagion between Chinese and G7 stock markets, finding an increase of comovements between them. Wang, Li and Huang (2020) analyse the existence of spillovers between financial markets and find that connections increased with the pandemic, especially in countries where it was more severe. Another example is the study by Hung (2020), which compared spillovers between developed stock markets and crude, concluding that spillovers are more evident during the pandemic.

Many studies analyse the effect of COVID-19 on stock markets but also on other financial assets. For example, Aslam, Aziz, Nguyen, Mughal and Khan (2020) analyse the impact of COVID-19 on exchange rate efficiency and conclude on reduced efficiency caused by the pandemic (as referred to previously in the case of stock markets); Iqbal, Fareed, Shahzad, He, Shahzad and Lina (2020) also analyzed the effect of the pandemic on the Chinese exchange rate; Sharif, Aloui, and Yarovaya (2020) analyzed the effects on oil prices; Aloui, Goutte, Guesmi and Hchaichi (2020) studied the comovements between energy future markets during the pandemic; Ji, Zhang and Zhao (2020) analysed the capacity of safe-havens of several commodity futures.

Following the trends seen in the literature before the COVID-19 outbreak, the number of papers analyzing cryptocurrencies and the impact of COVID-19 on these markets, or how particular currencies could be considered as safe assets, are also hot topics (see, for example, the work by Goodell & Goutte 2020; Conlon & McGee 2020; Conlon, Corbet & McGee 2020; Yarovaya, Matkovskyy & Jalan, 2020, among others).

With a different objective, James and Menzies (2020) apply a cluster-based analysis to the joint behavior of case and death counts, identifying information for public policies to reduce the mortality of the disease.

These studies show clearly the continuing interest in analyzing the effects of COVID-19, and for one of the issues under analysis, our chapter makes a comparison between the first and second waves of the disease.

COVID-19 CASES AND DEATHS AND THE RELATIONSHIP WITH STOCK MARKETS: A SLIDING WINDOWS APPROACH

Data and Methodology

As previously mentioned, our main objective is to analyse the effect of the number of confirmed cases and deaths on stock markets. To make this analysis, we retrieved data from 10 of the countries most affected by the disease at the moment of data retrieval, namely Belgium, Brazil, France, Germany, India, Italy, Portugal, Spain, UK and USA. Data range from March 2020 to October 2020, with the number of observations ranging from 151 to 169, as presented in Table 1 (the number of observations is different due to different transaction moments for the stock markets under analysis as well as the counting of daily cases and deaths). For each country we retrieved daily data for new confirmed cases and deaths (from <https://www.ecdc.europa.eu/>) as well as the closing price for the respective stock index (from <https://finance.yahoo.com/>).

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Table 1. Countries, indices and number of observations

Country	Index	Observations
Belgium	BEL 20	169
Brazil	IBOVESPA	168
France	CAC 40	160
Germany	DAX 30	169
India	NIFTY 50	167
Italy	FTSE MIB	169
Portugal	PSI 20	168
Spain	IBEX 30	151
UK	FTSE 100	169
US	NYSE Composite	169

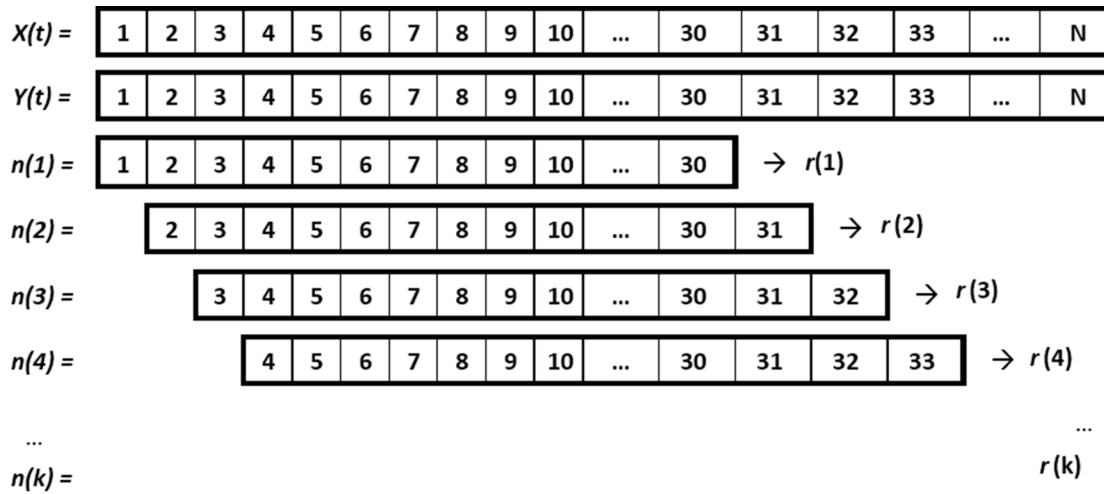
The original variables were transformed as follows: stock indices were transformed in log-returns, i.e.,

$$r_t = \ln P_t - \ln P_{t-1}$$

where r is the log return and P the closing price of the index, considering the respective moment t or $t-1$. Regarding cases and deaths, we transformed them in daily growth rates. Then, we performed the Pearson correlation coefficient measuring the relationship between indices' returns and the growth of cases and deaths. The variables used in the correlations are stationary, so Pearson correlations can be used. Due to the dimension of the samples, which ensure the verification of the central limit theorem, and due to the type of the variables, it is desirable its use than other correlation coefficients like Spearman. To assess the stationarity of the variables we used the usual ADF unit root tests. Due to space constraints, these results are not presented in the chapter but they will be supplied on request.

The Pearson correlation coefficient gives the correlation for a given time period. However, as we intend to analyse the dynamics of the relationships over time, we use a sliding windows approach for this purpose. Considering the properties of the Pearson correlation coefficient, we set windows of 30 observations, meaning that for each country the first correlation coefficient is calculated considering $t = 1, \dots, 30$, the second for $t = 2, \dots, 31$, and so on, with the last correlation coefficient used for the last 30 observations. Figure 1 depicts schematically how we obtain the different correlation coefficients (r). As we obtain several correlation coefficients, we can assess behaviour over time, identifying how the relationship evolved and if it could be different between the first and the second wave which is occurring in most of the countries at present.

Figure 1. Scheme of the use of sliding windows



Results

We estimated the correlation coefficients between stock market returns and the daily growth rate of COVID-19 confirmed cases and deaths for the whole set of countries, with the results shown, individually, in Figures 2 to 11.

The results are quite interesting and identify several important issues. Firstly, the most relevant markets have patterns with some similarities, although the strength of the correlations is different. In fact, the Belgian, French, German, Italian and US indices show negative impacts of COVID-19 on stock markets at the beginning of the sample, with non-negative/positive correlations during the following months, when the disease seemed to be controlled. From September, these countries once more show evidence of a negative correlation between COVID-19 and stock markets with the particularity that recently in Belgium, France and Italy, apparently deaths have a higher negative impact than confirmed cases. On the contrary, in Germany, the number of confirmed cases is more important than the number of deaths, while in the case of the US stock market the effect of these two indicators is very similar. These results, which are in general for more developed markets, show clearly that stock markets reacted greatly to the second wave of the disease.

For the remaining countries, we also find interesting results, starting with the case of the British index. If at the beginning, a negative impact of COVID-19 on stock markets is noticeable (with a higher effect caused by deaths), at the middle of the sample the effect was positive, as in the case of other developed markets (reinforcing the idea that the disease was somehow controlled), but recently the effect is almost null. This is an interesting result as it seems to show that this particular market considers that the measures taken in the UK have been sufficient to control the second wave of COVID-19.

The remaining counties have different patterns. Portugal and Spain have qualitatively similar patterns, with negative correlations at the beginning of the sample but positive ones at the end, although higher in Portugal. Although counter-intuitive, as it is expected that worse results in controlling the pandemic

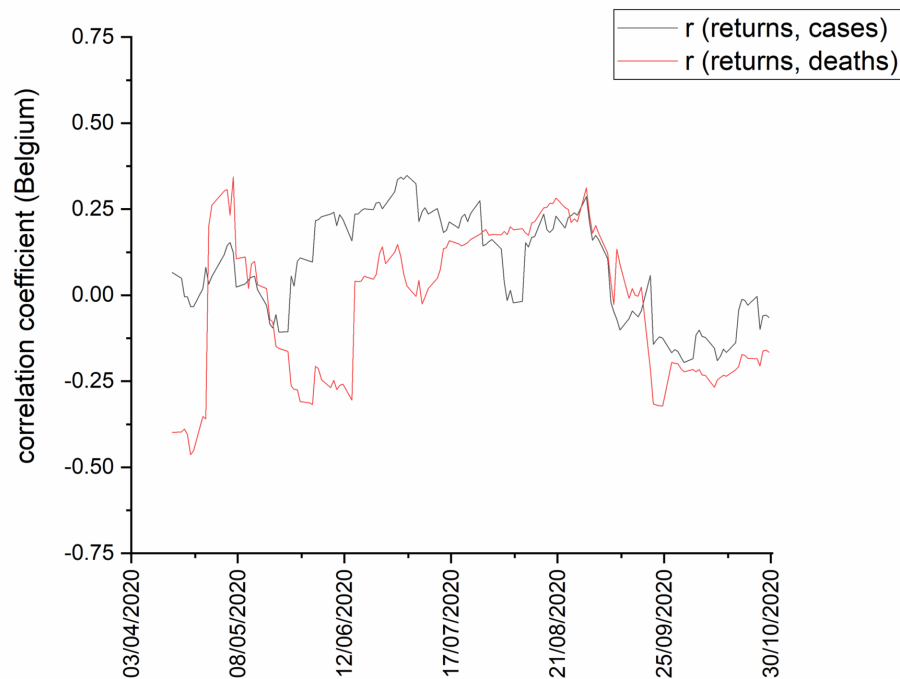
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imply greater losses in stock markets, this could be related to these markets being on the periphery of Europe, being influenced by the results of other major indices, rather than by the national results regarding the control of COVID-19. Another relevant reading is that in the case of Spain it was one of the countries which, at the beginning of the sample, showed the greatest effect of deaths on the respective stock market. This surely happened because Spain was one of the worst hit countries in the first wave.

The Indian stock market has a different pattern from the others, with negative correlations during almost all the sample under analysis, although at the end of the sample the correlations become more negative. This different behaviour of the correlations could be related to the country having some difficulty in controlling the spread of COVID-19 when other countries were considered safer.

Finally, in Brazil, the behaviour of the correlation is more stable over time and around zero, and it is also noted that cases have a higher impact than deaths. The stability of the correlation coefficients of Brazilian cases could be related to the country's statistics. Figure 12 shows the irregularity of the pattern of confirmed cases in Brazil, with constant peaks. As we are working with growth rates, we are constantly changing from positive to negative growth rates, implying a low relationship with the return rates of the Brazilian stock market. This is not observed in the remaining countries, so the figures are not shown. However, this information will be supplied on request.

Figure 2. Evolution of Pearson correlation coefficient between stock market returns and daily growth rates of COVID-19 confirmed cases and deaths, in Belgium



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Figure 3. Evolution of Pearson correlation coefficient between stock market returns and daily growth rates of COVID-19 confirmed cases and deaths, in Brazil

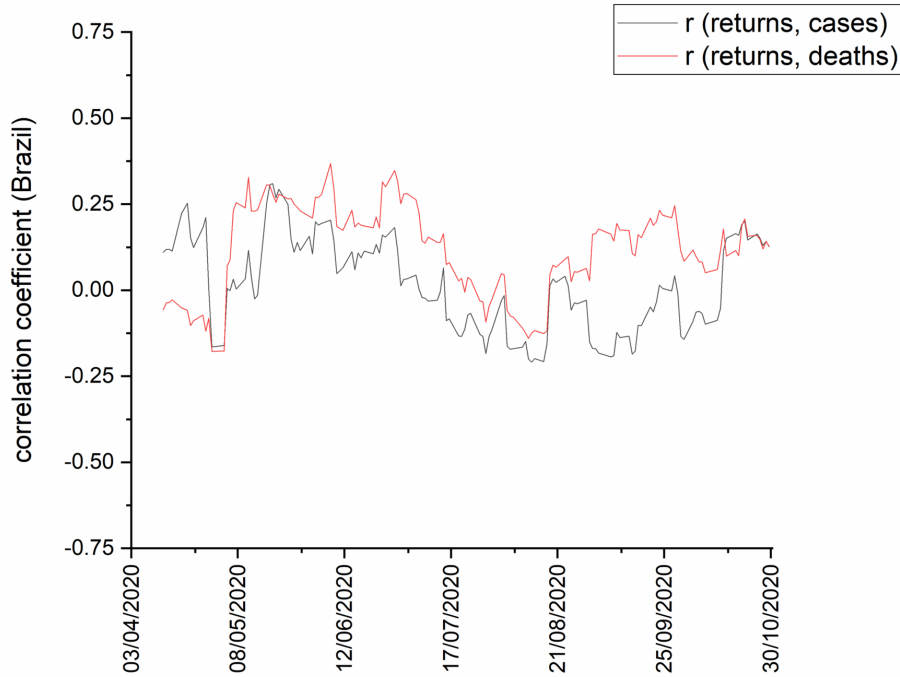
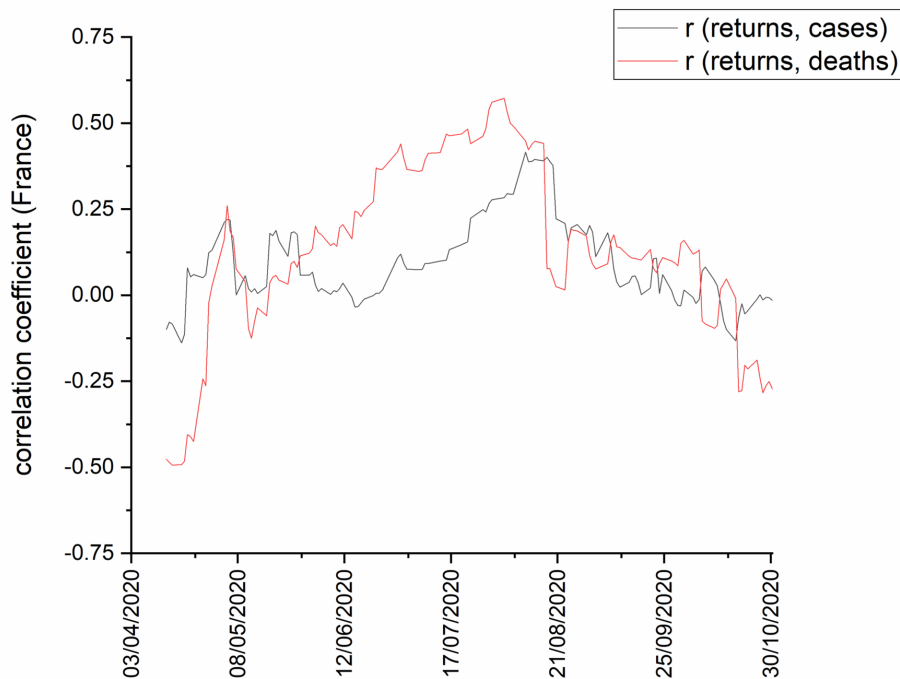


Figure 4. Evolution of Pearson correlation coefficient between stock market returns and daily growth rates of COVID-19 confirmed cases and deaths, in France



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Figure 5. Evolution of Pearson correlation coefficient between stock market returns and daily growth rates of COVID-19 confirmed cases and deaths, in Germany

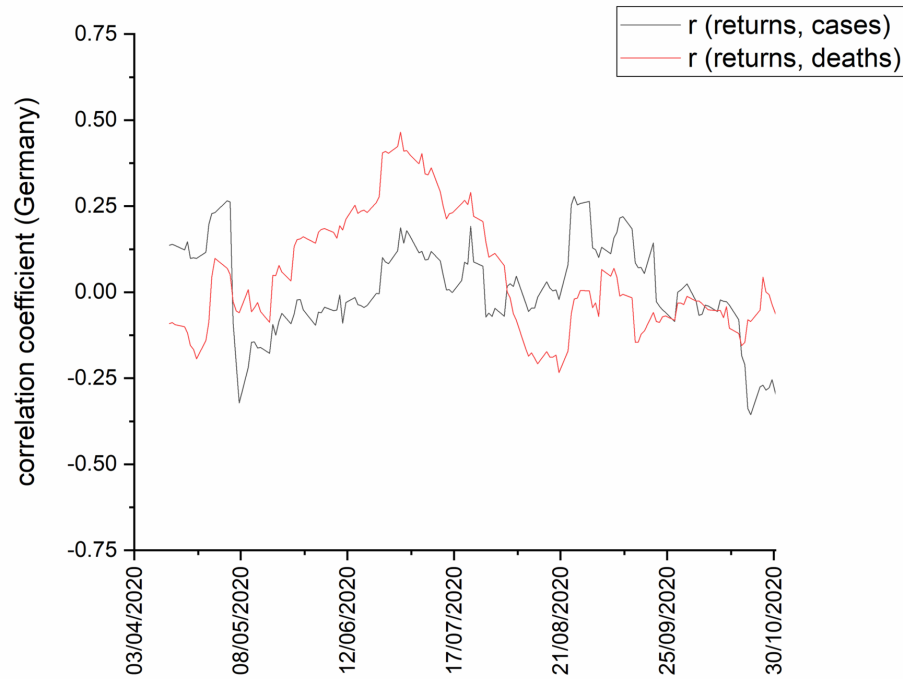
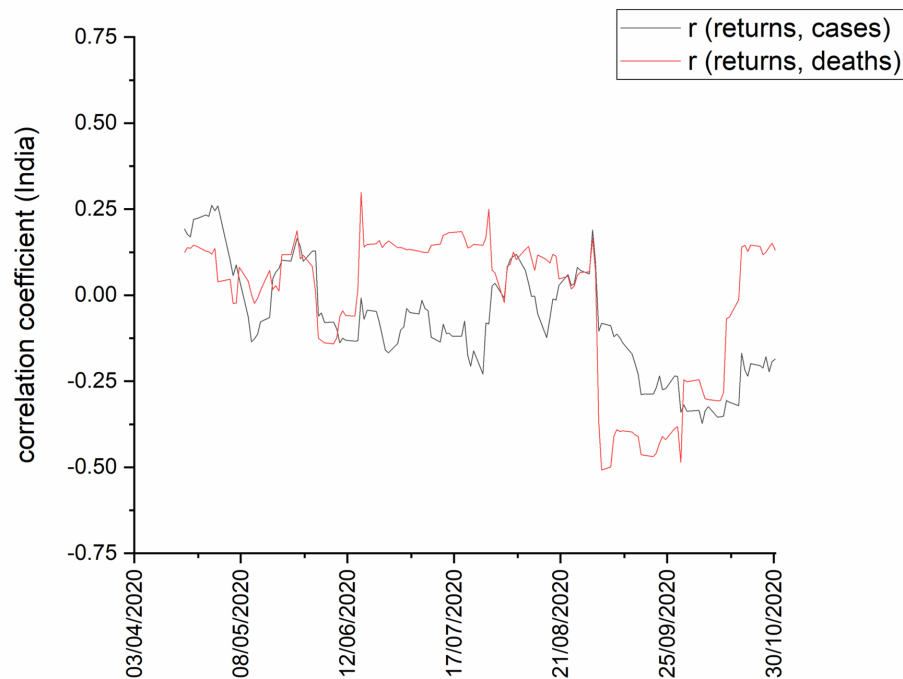


Figure 6. Evolution of Pearson correlation coefficient between stock market returns and daily growth rates of COVID-19 confirmed cases and deaths, in India



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Figure 7. Evolution of Pearson correlation coefficient between stock market returns and daily growth rates of COVID-19 confirmed cases and deaths, in Italy

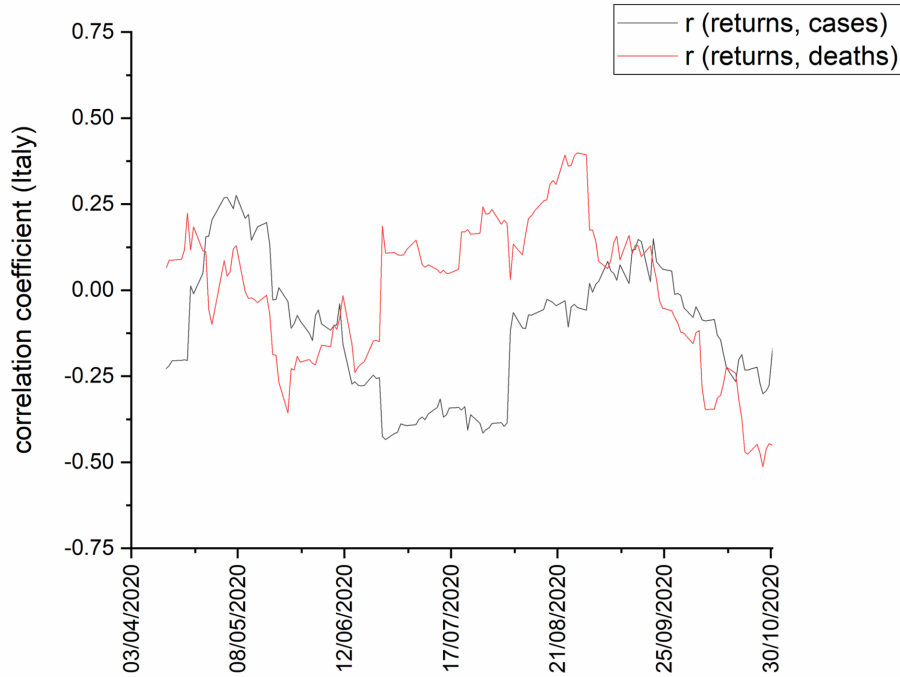
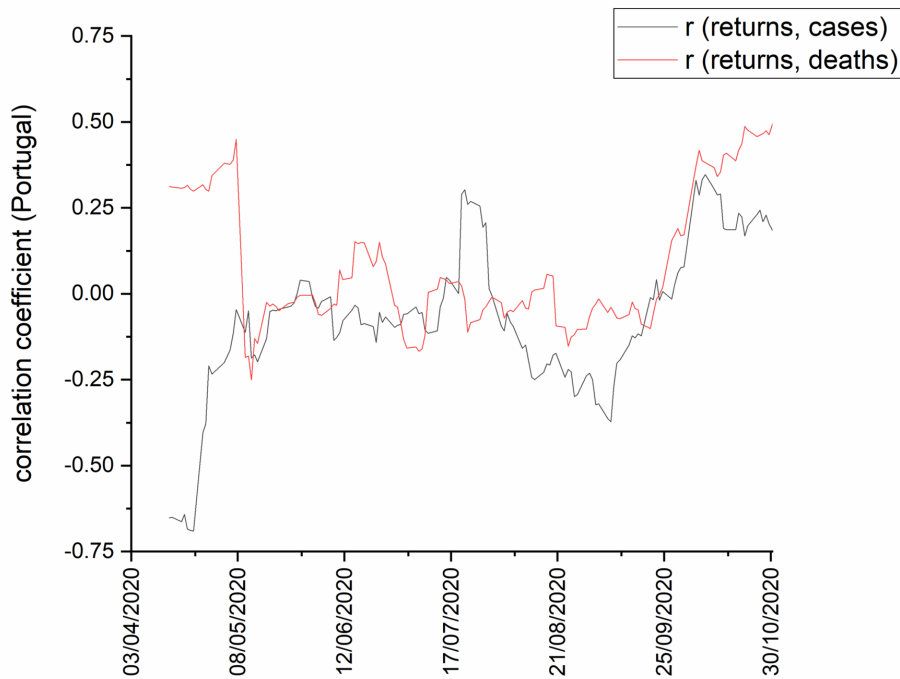


Figure 8. Evolution of Pearson correlation coefficient between stock market returns and daily growth rates of COVID-19 confirmed cases and deaths, in Portugal



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Figure 9. Evolution of Pearson correlation coefficient between stock market returns and daily growth rates of COVID-19 confirmed cases and deaths, in Spain

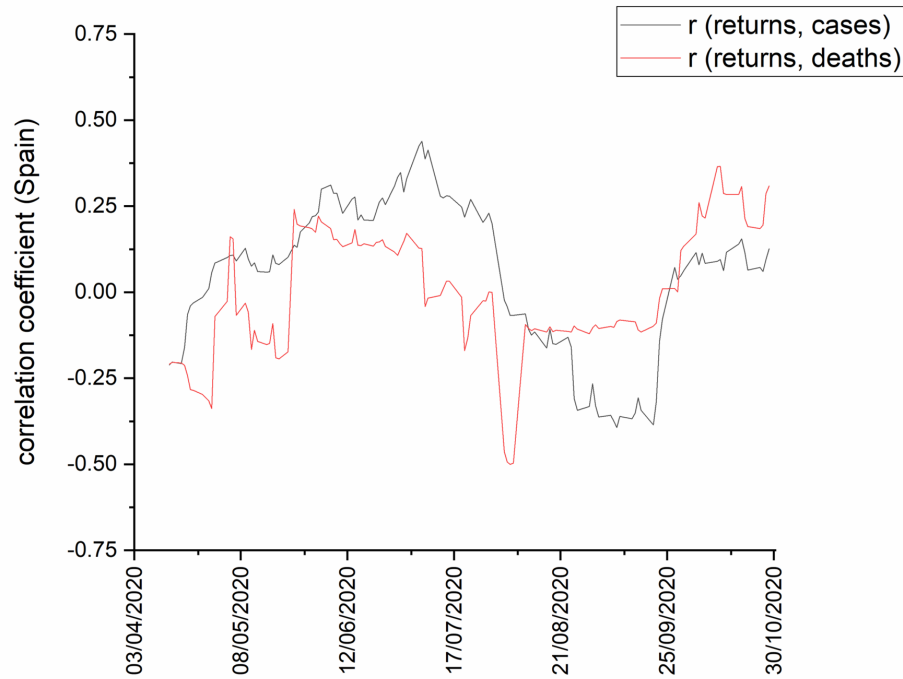


Figure 10. Evolution of Pearson correlation coefficient between stock market returns and daily growth rates of COVID-19 confirmed cases and deaths, in the UK



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Figure 11. Evolution of Pearson correlation coefficient between stock market returns and daily growth rates of COVID-19 confirmed cases and deaths, in the US

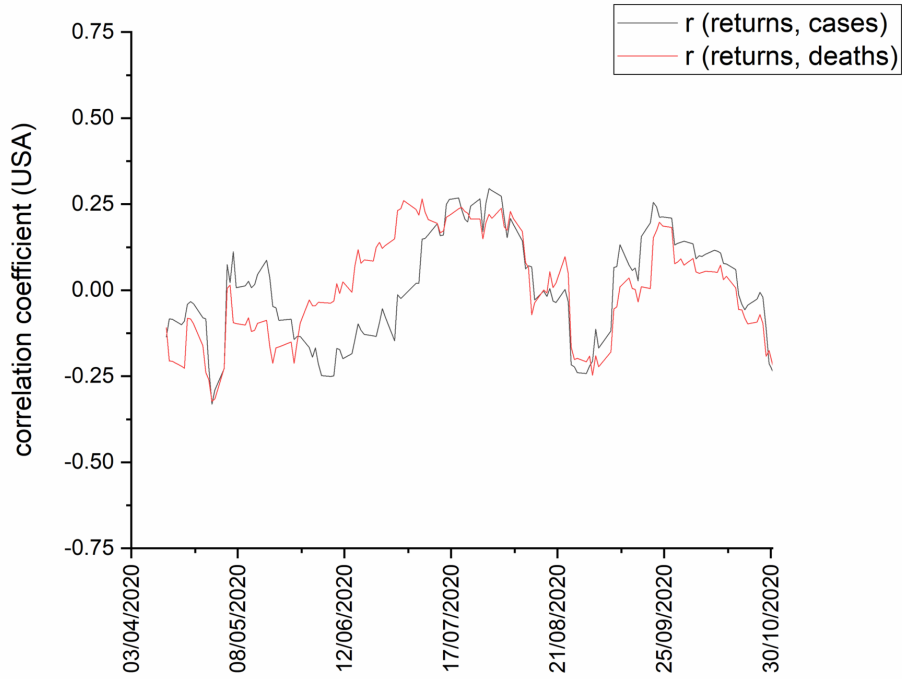
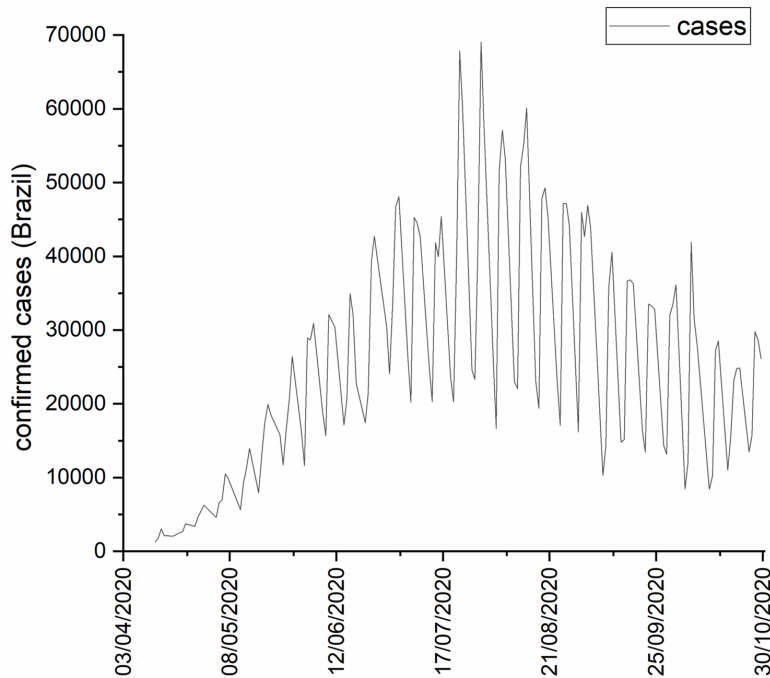


Figure 12. Evolution of COVID-19 confirmed cases in Brazil, during the sample under analysis



SOLUTIONS AND RECOMMENDATIONS

This work shows the relationship between the effects of COVID-19 (considering confirmed cases and deaths) on the stock markets of ten of the most affected countries, by the second wave currently affecting many countries. The results show that in most countries this second wave is affecting their stock markets again. Another interesting observation is that the impact of the number of deaths is many times higher than that of confirmed cases, which is contrary to the results found, for example, by Ashraf (2020) in a study at the beginning of the pandemic.

Obviously, the solution for the COVID-19 crisis is to fight the spread of the disease, either by the measures taken by the authorities or by the discovery and use of an effective vaccine. Nevertheless, the monitoring of financial markets allows understanding of how they behave, giving important insights into what can be expected if cases increase or decrease, helping to mitigate the possible negative impacts on the stock markets. The use of existing information to analyze financial markets' behaviour is not new, although normally it is approached with different objectives, namely analysis of the temporal dependence of time series, which is a wide field of analysis called the Efficient Market Hypothesis (see Fama, 1970, among many others).

In this particular case, knowing the past could give information for relevant actions, for example, for investors, who probably know that a reduction in cases could imply stock markets' recovery. The same happens with regulatory authorities, which could learn from these periods and be better prepared for future episodes or crises, regardless of being related to health or any other context.

FUTURE RESEARCH DIRECTIONS

The approach used in this chapter and the fact that COVID-19 is not already solved leave several possible directions open for future research. One is, obviously, the need to continue to analyse this kind of issue over time, to help support decision-making processes. This could imply extending the samples or even using different methodologies. In this paper we use the Pearson correlation coefficient, which is a linear measure, but other non-linear measures could be useful to study this kind of relationship. In some cases, using different approaches implies having bigger samples, for robustness purposes. Here, we can mention for example the use of Detrended Cross-Correlation Analysis (DCCA), Detrending Moving-Average Cross-Correlation Analysis (DMCA) or Mutual Information, which require bigger samples, but these could be used in the future when the whole COVID-19 situation is solved.

Another direction for future research is to analyse contagion between the variables studied. This is relevant, since it is related to the theme of market integration and how stock markets are interrelated. As well as revealing the evolution of crises, it could give the different market agents information about how to act or react in the future. This is also relevant because the literature seems to indicate that the connectivity between markets is different in calm and critical periods, and the use of complex networks is another possibility to make this kind of analysis.

In some cases, the analysis of regional data could also be relevant, in particular when information for the whole set of variables is available. While some of the countries analysed are small, others are big and formed of several states, which could help in this objective, and more importantly, give other kinds of insights into this theme, for example, identifying whether some regions are more relevant than others.

Finally, but no less importantly, when the COVID-19 crisis has passed, analysis of the stability of the financial system as a whole will still be important. Understanding issues like the effects of COVID-19 on the connection of markets could give important information about the stability of the system, helping authorities to act in the future, not to prevent the occurrence of other pandemics (which are not predictable) but the potential effects of future episodes.

CONCLUSION

In this chapter, we analyse how the growth of confirmed cases and deaths linked with COVID-19 have affected the behaviour of stock markets, in particular the return rates, in the case of 10 of the most affected countries. With data from March to October, using the Pearson correlation coefficient, and with a sliding windows approach, we can assess the dynamics of that relationship. The results are quite interesting, showing that in several countries, after an impact in March, stock markets showed some recovery, with the behaviour of their returns independent of COVID-19 numbers. However, in recent months, with the occurrence of the second wave, stock markets were in general negatively affected by COVID-19, as expected. Moreover, and also interesting, is the fact that in the second wave several countries reveal that deaths have a higher impact than the number of confirmed cases, contrary to the evidence in a previous study. With news of the possibility of having an effective vaccine soon to help solve this severe pandemic, this kind of information is very important for all market agents, to restore the necessary confidence to act in the markets.

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KEY TERMS AND DEFINITIONS

Contagion Effect: In finance, it is the way a financial crisis spreads at an international level.

COVID-19: Disease caused by a new kind of coronavirus, with 'CO' for corona, 'VI' for virus, and 'D' for disease, while 19 refers to 2019.

Growth Rate: Percentage change of a given variable in a given time period, in this case used to measure the variation of confirmed cases and deaths due to COVID-19.

Index Closing Price: Price of a given index at the end of the trading day.

Pearson Correlation Coefficient: Correlation coefficient, used to measure the linear correlation between variables.


Return Rate: Gain or loss of a given asset in a given period of time.

Sliding Windows: Methodological approach which allows us to make a dynamic analysis of data with chronological sequential samples.

Chapter 19

Contributions of the Pandemic to the Redefinition of Quality Management Systems in Higher Education: The Case of the Polytechnic Institute of Setúbal

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ABSTRACT

The COVID-19 pandemic required quick responses from the organizations, making it necessary for them to reinvent and rethink themselves. This reality was also evident in the higher education context, where the institutions had the need to assure the continuity of their activities remotely, without compromising the quality of the provided services (the educational and the support ones). This was a major challenge for the institutions' quality management systems (QMS), unusually designed to respond to rapid changes, especially in what concerns to an effective response to the students' needs. In the case of the Polytechnic Institute of Setúbal, the institutional response resulted from an action plan based on two major principles—the use of the existing quality's structure/instruments and its integrated reflection—in order to find improvement inputs to the system's performance. The results evinced a globally positive response but also the need to adjust the QMS to better serve the academic community's needs, particularly those of students.

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INTRODUCTION

The COVID 19 pandemic, experienced worldwide, required organizations to respond quickly and effectively to a radically different context. Facing a totally unknown reality, the organizations had the need to reinvent themselves, as well as their practices, giving more adjusted responses to the new challenges brought about by the pandemic. Thus, mobilizing their internal abilities for change and innovation, the organizations provided answers, in which their effectiveness depended on the level of development of their internal competences.

This situation was also evident in educational institutions, namely in Higher Education, where the need to provide an effective response to students' needs – so that they could continue their studies and, at the same time, ensure administrative responses – became urgent. This situation implied that Higher Education Institutions (HEI) had to mobilize, in a short period of time, a set of material, technological and human resources that would allow a rapid paradigm shift, in order to enable Distance Learning (DL) throughout all its training offer. A reality that put under pressure the entire functioning of the HEI. If, on the one hand, it was inevitable to continue its operation, on the other hand, the ability to maintain the levels of quality in its processes proved to be an enormous challenge. In particular for the HEI that were not prepared to operate exclusively on-line and for its Quality Management Systems (QMS) that normally have a strict structure, with limited capacity to respond to rapid changes and that are pretty much based in formal and bureaucratic processes.

The general perception is that, during this exceptional period, the HEI had an enormous capacity for change, definitively putting aside the idea of organizations that are stuck in time and with minor capacity to react to the society's challenges. It also demonstrates an enormous maturity in institutions' internal development and management and the important role played by the QMS. Taking into account the specific characteristics of Education, with high levels of flexibility, autonomy and skills of the main players, namely the teachers, it was possible to quickly adapt to the new reality, without significantly lowering the costs and, above all, with the quality standards normally required. However, not everything went well and there were several difficulties. What were (and still are) HEI's real capacities to respond to the students' needs, in a context that anyone were aware of? Was the process structured enough so that it did not become an informal superstructure in which the students felt lost and unprotected? And what were the mechanisms that guarantee that the evaluations maintained the levels of demand and robustness against fraud?

This article describes the Polytechnic Institute of Setúbal (IPS) response to the exceptional and changing context, resulting from the pandemic, the contribution of its QMS and the transformational challenges that arise in the near future.

QUALITY MANAGEMENT SYSTEMS IN HIGHER EDUCATION INSTITUTIONS

European and National Framework

The increasing encouragement of the implementation of Quality Management Systems (QMS) by Higher Education Institutions (HEI) at European and national levels – especially since the beginning of the twenty-first century – has allowed institutions to have the necessary framework to implement QMS, according to their organizational contexts. A framework and support for the certification of these systems

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has also been created in several European countries, through accreditation agencies, responsible for the accreditation of the courses and for the certification of the internal quality assurance systems. It is, therefore, within this framework that Portuguese HEI have been encouraged by the Higher Education Assessment and Accreditation Agency (A3ES), through a voluntary certification process, operating since 2012, which allows HEI to certify their QMS, in accordance with a national referential framework (A3ES, 2016) adapted from the Standards and Guidelines for Quality Assurance in the European Higher Education Area (ENQA, 2015).

It is, therefore, in a context of some diversity, that the Portuguese HEI have been adapting their organizational strategies, in order to implement QMS adapted to their contexts, implementing a set of measures in the area of quality management, applied to its different processes, although a bigger focus on teaching and learning process, as well as on research and development/ knowledge and technology transfer – “core processes” of all HEI – remains visible (Gonçalves, Ribeiro, & Serrano, 2017). This is an idea also mentioned by Manatos, Sarrico and Rosa (2017) that highlight that several quality management approaches in Higher Education seem to be learning-oriented, focusing on the students’ learning experience and educational development. At the same time, HEI have been submitting their QMS to certification, which have been contributing to a growing trend in the number of certified institutions in the last few years, being, at the moment*, 27 Portuguese HEI certified by the national Agency. However, it should be noted that the teaching and learning process seems to be the only “mission area” with a consolidated level of development in the certified QMS, evincing the other two (R&D and interinstitutional/ community collaboration) lower levels of development, revealing the need for further consolidation (Gonçalves, Ribeiro, & Serrano, 2018).

The Bologna Process, which has taken an essential role in the European transformation of Higher Education, has given special attention to the new perspectives for teaching methodologies and practices and to the desired transition from a teaching system based on transmission of knowledge to a system based on the development of students’ skills, in which the components of experimental or project work, among others, and the acquisition of transversal skills must play a decisive role^{†‡}. However, the evaluation of the effectiveness of this process remains weak and unstructured and cannot be concluded by its success or failure. If the entry level into the market of qualified professionals seems to be achieved – essentially, by shortening the courses – regarding pedagogical methods, it seems that few changes have been made (Bernardo, et al., 2018).

Thus, and being normally associated with the implementation of this type of systems a set of advantages such as accountability, detection of weaknesses and, simultaneously, the introduction of transparency and equity mechanisms (Duarte, et al., 2016), it is also true that sceptical criticisms continue to exist in the Higher Education context, underlining the fact that these systems may not represent the internal needs of the organizations, neither guarantee the response to the needs and expectations of the stakeholders, namely in what concerns the educational process. Also Pires and Saraiva (2018) – comparing the requirements of ISO 9001 and the A3ES referential framework and studying the QMS of six Portuguese HEI – found that those systems evinced difficulties in managing the teaching and learning process, often at administrative level (Table 1), also highlighting the need to reinforce stakeholders’ participation and involvement. Accordingly, the authors also refer the importance to investigate other forms of QMS’s intervention, as well as HEI’s internal organization and external positioning, in order to improve the effectiveness in fulfilling its mission.

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Table 1. QMS main difficulties and limitations

Theme	Common Difficulties	Comments
Strategic Plan (SP)	<ul style="list-style-type: none"> ■ The information to be used (to formulate the strategy) is not defined, nor the methodology for preparing the SP (the theoretical approach followed is not identified) ■ SP's monitoring is null or insufficient ■ The contribution of the General Councils is irrelevant 	<ul style="list-style-type: none"> ■ SP prepared by HEI responsible, based on their management objectives ■ Some guidelines should exist: context analysis (internal and external issues)
Courses' Conception	<ul style="list-style-type: none"> ■ Without methodologies supported by scientific knowledge ■ Teaching charges decided through "balance"/negotiation between scientific areas/departments/schools ■ No validation of solutions 	<ul style="list-style-type: none"> ■ Methodologies with theoretical support ■ Courses and structures validation can be carried out using known methodologies
Students' Surveys	<ul style="list-style-type: none"> ■ Assessment based only on students' perceptions ■ Surveys' representativeness not assured ■ Instruments that analyze the "historic" (e.g. last semester) ■ Instruments that tend to detect only extreme situations (often already known) 	<ul style="list-style-type: none"> ■ Perceptions' assessment should be complemented ■ Surveys can be planned and subject to validation and statistical treatment ■ Other real time instruments may have more advantages
Politics Results	<ul style="list-style-type: none"> ■ Results are not intended and therefore cannot be monitored ■ Its effectiveness is not assessed 	<ul style="list-style-type: none"> ■ Policies and guidelines should be periodically evaluated.
HEI's Comparisons	<ul style="list-style-type: none"> ■ No comparisons are made 	<ul style="list-style-type: none"> ■ Different levels comparison (e.g. curriculum, teaching methods, results, indicators) allows to minimize deficiencies in course's design/operation ■ Self-assessment also requires external comparisons
Monitoring	<ul style="list-style-type: none"> ■ Focused on the teaching-learning process ■ In many cases, without quantified results ■ Approaches' effectiveness not assessed ■ Processes' variables not investigated (e.g., results) 	<ul style="list-style-type: none"> ■ Teaching-learning processes can be the object of scientific research, as well as some of the most relevant issues (e.g. failure, dropout, employability) ■ Approaches can be evaluated
Technical-scientific Councils (TSC)	<ul style="list-style-type: none"> ■ TSC are "out" of QMS ■ They do not even guide or monitor the R&D activities, being very reduced to the careers' management 	<ul style="list-style-type: none"> ■ Refer to administrative and management activities (juries' approvals, deliberations) ■ Don't guide R&D and its results, ■ No defined R&D policies and guidelines ■ Teachers integrate external R&D centers in the absence of other guidelines
Educational Project	<ul style="list-style-type: none"> ■ The training offer tends not to be focused on differentiating scientific areas 	<ul style="list-style-type: none"> ■ It results, either from deficiencies in the strategic orientation, and from the management bodies' weakness. ■ Focus on few areas could improve R&D and contribute to the courses' statement.
Information Systems	<ul style="list-style-type: none"> ■ Insufficient systems, both from the QMS and the general management perspectives 	<ul style="list-style-type: none"> ■ QMS development's levels are strongly conditioned by the functionalities of the computer and information systems.
QMS's Structure	<ul style="list-style-type: none"> ■ Usually a quality office with technical staff: in some cases, commissions for specific purposes (e.g. evaluation) 	<ul style="list-style-type: none"> ■ Minimal support structures that limit QMS development ■ QMS are still not seen as management bodies' support (additional tasks)

(Pires & Saraiva, 2018)

The Stakeholders as Improvement Elements

Williams (1993) had already identified the three main entry routes for HEI quality's approaches, namely:

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1) the participation of people from the business world in the management bodies of the HEI, carrying positive experiences on quality's benefits; 2) the explicit pressure from governments, in the search for new financing methodologies, that have encouraged the HEI to a mass higher education without the corresponding increase of resources; and 3) the rapid diversification of several HEI's functions during the 1980's, which took them, for example, beyond having the normal degrees of education and conventional research, to also have learning and research contracts.

In fact, the satisfaction of the stakeholders' interests and expectations is inseparable from the principles of quality management, also in the context of Higher Education. However, what happens is that the answer given by the HEI is not always the most appropriate, becoming essential that this organizations can collect and use, more and more, information from their stakeholders, in order to enhance their involvement in the academy's activities. An idea also mentioned by Tavares, et al. (2017), who stressed the importance of using information to induce changes in teachers' perceptions of the teaching/learning process, when they feel more involved in the development of quality assurance.

This question takes us to the conceptual challenges created by the third generation of quality management (Table 2) and to the idea of Foster and Jonker (2020, p. 686) when they refer that "*To better understand the third generation theory of quality management – including the pivotal role that it gives to stakeholders and the changing perceptions of organisations and their societal connections – requires a new perspective on “the firm”*".

Table 2. Characteristics of the three generations of quality management

Characteristics	1st Generation	2nd Generation	3rd Generation
Perspective on quality	Process	Holistic	Relational
Focus	Measurement	Assessment	Understanding
Type of action	Reactive	Proactive	Engagement
Criterion for success	Reliability	Efficiency and effectiveness	Accountability and transparency
Orientation	Production	Processes	Relationships
Basic assumptions	Control	Manageability	Inter-connectedness
Change	Improvement	Change	Transformation and transaction
Stakeholder relationships	Non-existent	Peripheral	Embedded
Characteristic of engagement	Non-existent (and/or) philanthropically	Deal-making (and/or) community involvement	Complementarity and sensemaking
Conceptual nature	Tools and techniques	Techniques and methods and principles	Theory re “fit” of organization and context
Culture	Irrelevant	Unity of sameness	Unity of diversity

(Foster & Jonker, 2020)

Beyond the importance of the stakeholders' involvement, the *third generation of quality* (Table 2) also highlights two essential aspects in the decision-making process. The *relational component* (perspective on quality), where it becomes necessary for the different actors to have the ability to relate, regardless their formal skills and functions, and the *understanding component* (focus), according to which it is

essential to go beyond the relationship, and seek concerted and articulated decisions, considering, as much as possible, the different perspectives. ~

In this sense, the way the HEI are managed is also a determining factor, making, as recognized by Sarrico, Veiga and Amaral (2013), that balanced and adequate management systems can be seen as a necessary requirement for the production of results related to quality improvement. In fact, within the scope of the quality movement, at a general level, it is recognized that the quality of services is increasingly moving upstream, that is, towards proximity to society, the market and its needs. As such, QMS should establish practices and/or procedures for study that deepen these needs, based on structured methodologies capable of transposing them to training offers (Lourenço, et al., 2019).

The governance of HEI in the European framework has registered a trend towards the valorisation of collective bodies, with representation of external members, who assume the central responsibility for the strategic definition of the institution, for the monitoring and supervision of its success and for its reporting. One of the fundamental principles on which these bodies are based is rooted in the HEI's autonomy movement, to which a set of mechanisms of accountability has progressively been associated, in a perspective of reinforcing transparency and a bigger openness to society, seen as the third vertex of the governance of these institutions (Lourenço & Mano, 2017)

According to Pedrosa, Santos, Mano & Gaspar (2012), the major change that has taken place in the internal governance structures of European HEI, particularly after the Bologna Process, has been the increasing level of participation of external elements in their governance, in some situations with the consequent decrease of internal representativeness. A reality that, according to the authors, brings to the institutions' boards a higher demand and responsibility in the exercise of their functions, taking into account that they have to be able to combine academic interests, with the contributions of external elements and with an efficient management of resources.

Regarding HEI's autonomy, there was a significant increase, comparing to previous laws, with the emergence of four new types of autonomy: definition of the mission, academic, cultural and diversity of organization. The autonomy related to the internal governance structures was already included in the Autonomy Laws of 1988 and 1990, with RJIES¹ having deepened and clarified it. In addition to the mandatory bodies, the General Council, the Rector/President and the Management Council, provide that higher education institutions are organized freely and in the way they deem most appropriate for the accomplishment of their mission.²

Based on three of the internal QMS's fundamentals, namely, the response to external standards, the provision of information for decision making and being a source of information that allows academic development (Elken, Frølich, Maassen, & Stensaker, 2020), it is important that the coordination and involvement of the different actors in the decision-making processes is real and effective. Thus, being true that HEI have implemented QMS in order to be more competitive, it is also true that it will be necessary to adopt a more holistic perspective and to have a more inclusive and comprehensive approach to QMS in the Higher Education sector (Nasim, Sikander, & Tian, 2020).

Quality Management Systems and the Pandemic

The Quality Management System assumed an important role in the management of organizations during the pandemic, particularly in Higher Education Institutions. In addition to allowing greater stability to all processes, responding to formal requirements, reinforcing competitiveness and anticipating different scenarios and solutions (Oliveira, 2020), also enhanced the planning, the identification of improvements

and, above all, the narrowing of relations between the different actors (Gusso, et al., 2020). In fact, one of the essential questions that the QMS raised during this period was the importance of people inside the organization, and the need to respond to the human aspect, highlighting the skills of empathy, cooperation, communication, serenity, resilience and the capacity of relationship between the teams, as key pieces of success. According to Tapper e Asrani (2020), in an approach more linked to the health area, the essential thing is that the Quality Management System adapts, based on four key points: 1) proactivity, that is, the ability of people to act before problems exist, even if this implies actions that do not correspond to what is defined in the internal systems, as long as they are actions with the capacity to anticipate problems; 2) modify the type of intervention, that is, be willing to do it differently, in order to respond to the effective needs of the different stakeholders, in a logic in which it is the organization that adapts to the interested parties; 3) integrated perspective, that is, the performance must be seen in an integrated way among all the actors, so that the actions do not have a particular view, but a global view; and 4) coordination, that is, the ability to place those primarily responsible for coordination actions that give meaning to this global vision.

For this integrated and coordinating perspective, a coherent response from all areas of organizations is essential, in an articulated perspective of the different approaches to quality systems, not only from an internal perspective, but also from an external perspective, involving suppliers and service providers. (Salimi, Sampaio, & Golmaryami, 2020). According to the United Nations Industrial Development Organization (UNIDO) (2020), the UN agency which aims to promote and accelerate Sustainable and Inclusive Industrial Development, identifies quality infrastructure as essential in this pandemic period, looked as a systemic and holistic approach, in a way that, at the same time, quality systems work efficiently and economically, but also suited to their purpose. The training and cooperation are the essential mechanisms for the development of quality standards along the value chain.

Central to this whole process associated with COVID-18 is the issue of information, not only in the logic of the essential quality requirement associated with the fact-based decision-making process, but also in the digital transformation and the integration of technology in the different processes organizational (Samartinho & Barradas, 2020). According to the authors, this reality implies profound changes in terms of technology, culture and operational activity of the organizations, in order to make them more agile, more competitive and with a greater capacity to adapt to the requirements of interested parties. In the area of teaching, the great transformation in the use of learning management systems was evident, with the widespread use of available technological tools, and the significant improvement of collaborative work, both within the HEIs and between HEIs, in this learning processes that has to be very fast (Jena, 2020)

Polytechnic Institute of Setúbal Quality Management System

Assuming quality management as a central element of the institutional strategy for the continuous improvement of its activities, IPS defined a QMS, organized according to its organizational context. This system, which identifies the responsibilities of the different bodies and services in this area, as well as the participation of students and other stakeholders in quality assurance processes, follows from the IPS's Quality Policy.

The IPS's QMS is based on four fundamental elements. Firstly, it follows a process-based approach, organized according to the traditional classification: *strategic management*, *main* and *support* (Pires & Lourenço, 2010). Second, it follows a PDCA cycle with annual cycles of definition of system improvement objectives (per process) and validation of compliance. Third, it is a system established on a fact-

based management, whether they are performance indicators or evidence of the actions implemented. And finally, it is based on a management structure (Figure 2), that, in addition to a central unit, includes a coordinating body that integrates students and the different organizational decision makers, namely the Schools' Principals, and a set of local structures that guarantee the operational component.

Based on the principle that what is unknown cannot be managed, the basic element of the IPS's QMS is a monitoring system based on the information available in the different schools and services. Based on a process-based approach and a systemic view, the priorities were, since the first moment, related to the establishment of an information system that would support all levels of decision and, at the same time, adding knowledge, based on applied research, carried out in the context of the organization, as well as other theoretical contributions.

Process Approach

Considering the IPS's Quality Policy and Objectives, the QMS processes are in line with the National (A3ES, 2016) and European (ENQA, 2015) referential frameworks for quality assurance. Following a process-based approach (Figure 1), the system integrates a set of interrelated processes of four types: 1) *Strategic Management Process* (which defines the development and continuous improvement policies; 2) *Main Processes* (which frame the activities developed in the areas of: *Teaching and Learning, Research & Development, Interinstitutional and Community Collaboration and Internationalization*); 3) *Support Processes* (which support the main processes of *Human Resources; Material Resources and Services; Information Management; Public Information*); 4) *Process of QMS Review and Continuous Improvement* (that evaluates the effectiveness and efficiency of the system). These processes are periodically monitored and evaluated by performance indicators, according to the organizational structure.

Organizational Structure

For the operationalization of its QMS, IPS defined an organizational structure (Figure 2), which is permanently adapted to the needs of the monitoring and the managing of the processes. The responsible for the QMS is the IPS President, who coordinates the Quality Council, the body responsible, among other powers, for analysing the proposals for revising the system. This also integrates a central structure (Quality Assurance Central Unit), a coordination structure (Quality Management System Center) and seven Units of Continuous Improvement (UMC), one per School, one on the Central Services and one on the Social Services, which guarantee the local implementation of the system.

One of the main characteristics of the IPS quality structure is the integrative perspective of the different bodies, not only because it integrates representatives of the different decision-making bodies, but also because it provides for the recurrent participation of students in the different structures, whether in the Quality Council, either in the coordination unit, or in the local structures. Student's participation is one of the essential recommendations for the HEI's QMS, either at National (A3ES, 2016) or European level (ENQA, 2015), an aspect that stems from the fact that students can be understood as a special type of stakeholder (Lourenço & Mano, 2017). If, on the one hand, students are external stakeholders, who use the HEI's services, on the other hand, they are internal stakeholders that actively contribute to the provision of that services, both at the level of their own action and at the level of the decision-making process.

Contributions of the Pandemic to the Redefinition of Quality Management Systems in Higher Education

Figure 1. Polytechnic Institute of Setúbal QMS (Process Approach)

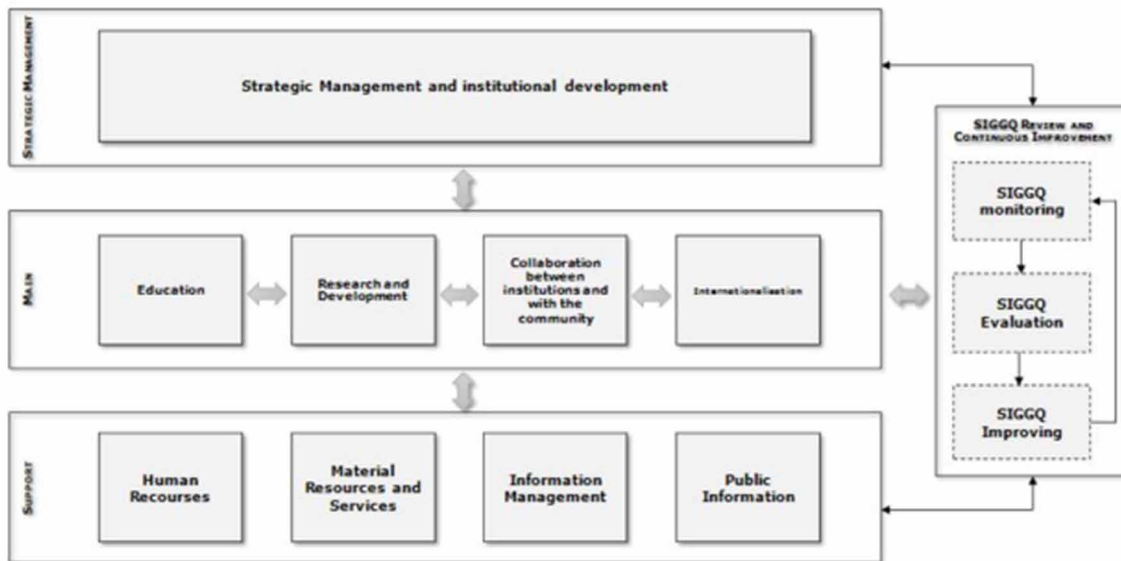
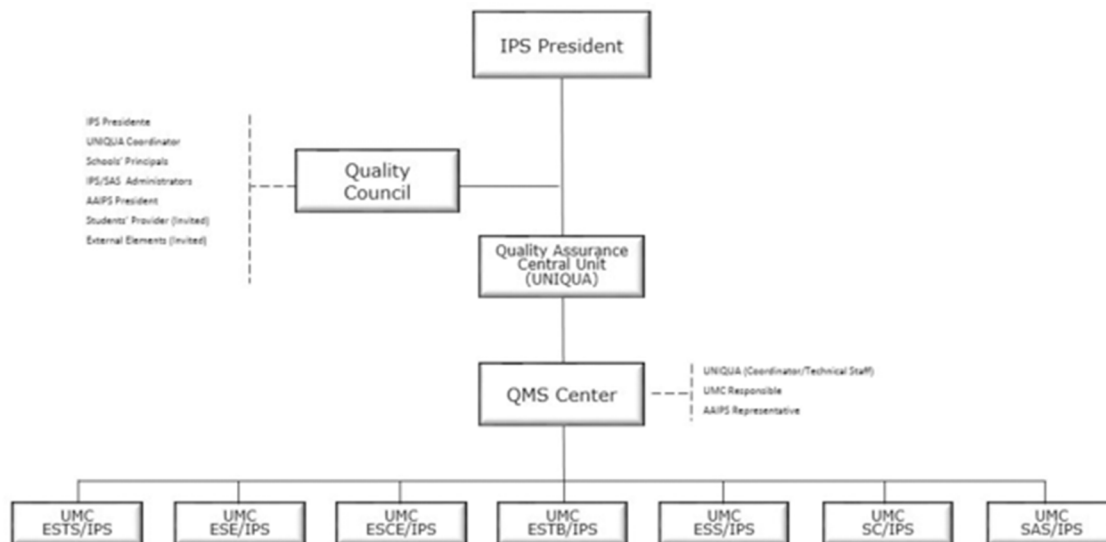


Figure 2. Polytechnic Institute of Setúbal QMS (Organizational Structure)



Integrated Response to the Pandemic

The Covid-19 pandemic directly affected HEI around the world, which required exceptional measures that would allow the continuity of educational processes without major shock. In addition to the need for alternative solutions that provide effective responses to the needs of students, it has become important

to carry out studies that make it possible to understand and document the impacts of the pandemic on the education systems, as well as the creation of greater flexibility in its functioning, namely in their curricula, with a greater capacity to respond to students' learning needs, far beyond conventional classrooms (Toquero, 2020).

IPS focus was to keep all teaching activities in operation (with the best possible response) and, at the same time, all administrative responses to students remain operational. This is because, in terms of the organization, it is considered that distance learning does not only mean students' access to classes and assessment moments, but also that they have access to services directly involved with the teaching and learning process, such as libraries and IT resources.

IPS understand, therefore, that distance learning is not limited to ensure that teaching and learning activities are carried out at a distance. It is important, but not enough. All support services must also be guaranteed at a distance and if it was relatively easy overnight to start classes online – IPS had, like many other institutions, tools like Zoom, Teams or Skype – in other services the answer would not be that immediate. Even so, this change became possible and, for example, at the level of the academic services, individual attendance with students was virtually made, by appointment.

The services that IPS provide to its students go far beyond teaching and learning activities and that is precisely the institution's perspective when thinking about its quality management system: the need to always act in an integrated way. For this reason, and in this exceptional situation, IPS concern was, from the first moment, to give students the maximum of online facilities, very close to those they were used to having in person.

Intervention Phases

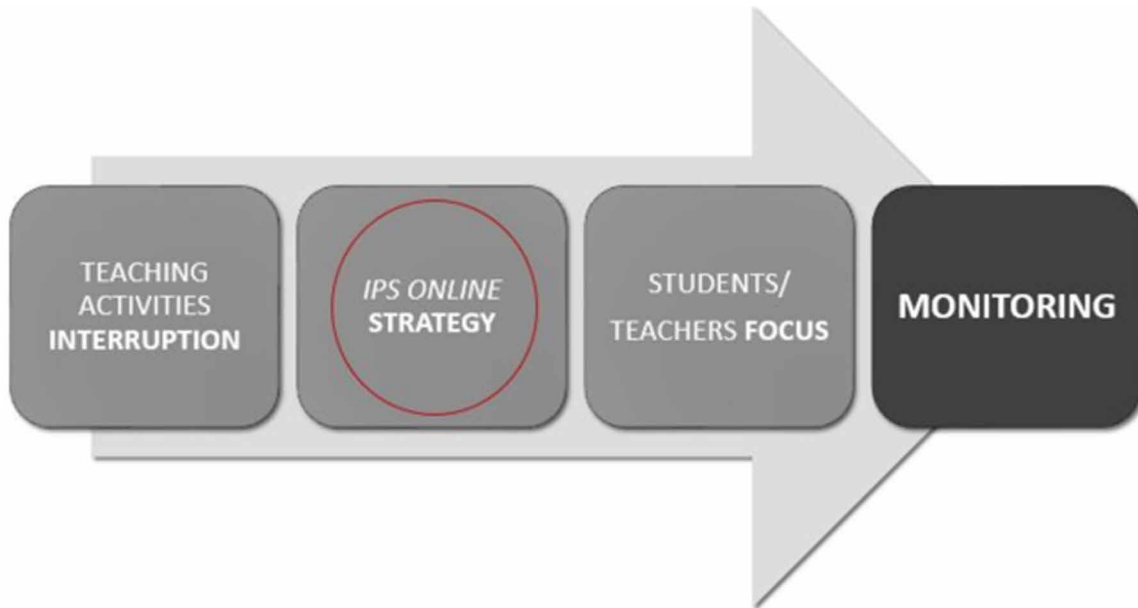
The organizational response was articulated between the top management and the responsible for the QMS processes most directly related to the pedagogical component – *Teaching and Learning* and *Material Resources and Services* – involving and holding accountable those whose responsibilities were in the main action areas. The intervention, that lasted about 4 months, included four distinctive phases (Figure 3):

The process started with the *Interruption of all the teaching activities* (**Phase 1**), in order to prepare the online mode and allow the adaptation of all the activities to Distance Learning (DL). This included all the activities within the scope of teaching and learning, as well as the ones related to the support services provided to students. This preparation phase, during the interruption, allowed the implementation of the "IPS online strategy" (**Phase 2**), providing this form of access to all the activities and services. During this phase, the most important was to assure the students that there was an organizational response and purpose and a good coordination behind all the steps that were been given, so that they can felt more confident and comfortable in this complex process. It was also with this purpose that **Phase 3** was the *Focus on the students' and teachers' needs*, ensuring that all the necessary resources were made available.

During this phase, they were given access to all the necessary IT tools, being also provided support programs for deprived students. In this third phase, IPS reinforced the teachers' pedagogical training plan, redirecting and focusing the existing one to the use of DL platforms and methodologies and produced guiding documents on best practices in the teaching area, interaction and evaluation in the context of DL. Regarding students, a very strong campaign was made to minimize the impacts of distance learning and social inequalities, with a computer loan program (by IPS, by students or by third parties) as well as a broadband provision by the Students Association. Concerning the *Monitoring of the DL adaptation* (Phase 4), the focus was to monitor the entire teaching learning process, so a follow-up group was

created with that propose, with weekly meetings assuring a permanent analysis of the situation. It were also defined weekly meetings with the Students Association that also produced a weekly report where the students identified the most complex situations. Surveys were also prepared for teachers and students where it was possible to verify the greatest difficulties of both groups.

Figure 3. Intervention Phases



Action Plan

Considering the different levels of action and responsibility, the organizational response included an Action Plan based in four elements (Figure 4):

The *Coordination (Element 1)* process was crucial to the effectiveness of the organizational response. The Action Plan integrated the creation of a coordination group responsible for the DL process and the first concern was to permanently communicate with the different actors throughout the process. IPS knew that if this communication was not fast and fluid enough, the organizational response would be highly compromised. Each school identified a member of its management body that would be the (local) responsible for the implementation of distance learning. This *Distance Learning Coordination Group* met weekly with the person in charge at organizational level (a member of the Presidency) to analyse the entire transition process. Besides allowing to have access to information about the process, to be able to respond, it was also possible to discuss many of the issues associated with distance learning, which allowed IPS to gain a lot of knowledge about it.

Figure 4. Action Plan Elements



Regarding *Orientation (Element 2)*, IPS invested in the creation of guiding documents and a webpage on distance learning. This set of global guidelines for orientation allowed teachers to have common understandings on the same themes, supported by a group of facilitators within each school. This facilitators – expert teachers in the field of distance learning, recognized as such by peers – allowed another crucial contribution to the organizational response in two levels. Regarding the definition of the guidelines that were created in terms of the organization’s response, but mainly in relation to the teachers themselves, because it facilitated and streamlined the responses between teachers, instead of waiting for the structure’s responses.

The creation of reference documents was an essential contribution, but above all, the fact that the specialist teachers sought to give recommendations, with concerted examples of how to apply different methodologies, techniques, tools and technologies in the service of distance learning, was fundamental. In this regard, the fact that collaboration between teachers has been remarkable throughout the process is underlined. In turn, and with regard to the major difficulty, it was at evaluation process level. A difficulty essentially due to the lack of experience – despite previous experience in distance learning, the evaluation was traditionally in person – but also due to the enormous distrust of the possibility of fraud by students.

The *Training (Element 3)* was based in a teachers’ training program, in technical, methodological and pedagogical contents on distance learning, that also integrated the organizational response. The training plan was essential. The IPS had one in the pedagogical area of teachers since 2015, and currently more than half of its teachers have completed one or more training courses in the pedagogical area. It has been a very big gamble. When IPS faced the pandemic, the institution immediately redirect its training plan. In a first phase, it was made a quick training in Moodle and TEAMS platforms, for those who had never used those tools. Then, it was created an internet page with a set of resources on distance learning, so

that all teachers could equip themselves with a vast set of theoretical concepts, practical applications and tools associated with distance learning. After that, IPS moved on to a training plan in distance learning methodologies, with a group of specialists in the area, and trained about 120 teachers in these type of methodologies. Finally IPS moved on to a more advanced training in Moodle, mainly focussed to distance assessment methodologies. It was a very enriching and very satisfying process for teachers.

And what has happened is that this training plan has proved to be an essential element. IPS has an Institutional Pedagogical Training Plan for Teachers since 2015, and since then it has been a strong endeavour for the organization. However, in an unpredictable and unexpected situation such as the pandemic, the need arose to redirect and adapt this training plan immediately, with a view to an effective response to the current needs of teachers and which are based, to a large extent, on distance learning content.

In a first phase, a quick training was done in Moodle and Ms TEAMS, for those who had never used these tools, and in a second moment, a web page was created with a set of resources on distance education, so that all teachers could have access to a wide range of theoretical concepts, practical applications and tools associated with distance education. In a third phase, a training plan for distance learning methodologies was adopted and, using specialists in the field, it was possible to train around 120 teachers in these methodologies. Finally, more advanced training in Moodle was started, mainly aimed at the distance assessment process. It was a very enriching and very rewarding process for teachers.

Regarding the *Monitoring (Element 4)* was mainly based in meetings with the coordination group and the Students' Association, and surveys applied to students and teachers. This last phase of the plan allowed the organization to obtain in real time – from the various elements of the academic community – an important feedback on the work that was being carried out, which allowed the identification of strong areas and areas that need further improvement.

Integration With the Quality Management System

Regarding the organizational response of the “IPS online strategy” integration with the QMS, it cannot be said that there was a strategic explanation. In unpredictable situations, like the pandemic one that is being experienced worldwide, decisions are (inevitably) made at the moment. But the most important was the strategic orientation and that was very clear, since the first moment: respond to the students' needs. The main concern was to have an extended alignment between the different actors – school directors, pedagogical councils, course coordinators, teachers and workers – assuring that it would be as broad as possible. That was the strategic orientation and the identification of this orientation was considered essential to have an articulated response capacity.

What this experience (and organizational response) allows us to prove is the fact that if, in normal times, strategic alignment is fundamental, in crisis situations, this alignment becomes even more fundamental. Only an in-line orientation between all stakeholders allows a joint and in-line response. In strategic terms, this implies thinking also in terms of Quality Management, in particular, in terms of QMS, which allow it to be managed in an integrated way. It is not possible to think one thing without the other and it was based on this assumption that the organization acted throughout this process. The organizational response was as integrated as possible, starting from the QMS itself and from the strong systemic component that was at its base and that the organization always tries to keep, both centrally and locally, in the various schools and services, in a very strong relationship between all performance variables.

RESULTS

The feedback obtained from students and teachers during the monitoring phase (by survey and in the meetings that were held with the coordination group and with the Students' Association), demonstrated that the results of the plan were globally positive, highlighting, on the one hand, some more developed aspects and, on the other, others that need further consolidation.

Strengths

1. Students' information technologies needs response
2. Teachers' commitment and support
3. Teachers' use of Information Technologies
4. Clearly defined responsibilities
5. Coordination capacity
6. Better-informed decision-making process
7. Teachers' training plans procedures
8. Focus on new teaching methodologies

For the identification of these *strengths*, it was also possible to verify the contribution of the QMS (Figure 5), which has assumed itself as an important facilitator of the whole process. Following a process management, with clearly defined responsibilities and mechanisms for monitoring the teaching and learning, in addition to procedures associated with teacher training plans, it is a system adjusted to the institutional context, which allows quick and flexible responses, adjusted to concrete situations.

Figure 5. Quality Management System contributions for the Action Plan



Weaknesses

The feedback from students and teachers also made it possible to identify aspects to improve, namely with regard to the operation of the QMS. It was possible to identify a few areas that need further consolidation in the system's scope, not only due to its importance for the institution's performance, but also due to its still little optimized functioning, namely:

1. How to evaluate and adjust the excessive workload of students

During this period, there was an excessive growth in the learning activities. All teachers created different activities, with the aim of diversifying the evaluation mechanisms, using as less as possible the most traditional one, the tests. This was a positive aspect and one of the recommendations of the coordination group. However, in a situation where "all teachers do the same", it is understandable that, from the student's perspective, they perceive that there is a significant increase in academic activities. This modification may not mean a real increase in the number of working hours, but the increase from three to nine activities, even with less associated work, is understandable considered, by students, as a significant increase in the workload. [Furthermore, the authors highlight the fact that, due to the general confinement, many students had to share their study/workspace with their families, and in some situations with limited access to information technologies. An aggravated situation in the case of the working students who had to reconcile their different life's spheres (family, professional and academic).]

Regarding this, it was possible to verify that IPS was not using any mechanisms to evaluate the students' workload, during the continuous evaluation process. Normally, the institution has this regularly approved and evaluated at the beginning of the semesters, either by the Pedagogical Council or the Course Coordinators, however, in exceptional situations (like the pandemic), the process revealed to be no longer fast and expeditious enough to analyse the changes that are effective in the scheduled evaluations. A possible solution to this problem could be the possibility of the information system allowing the teachers to register all the assessment moments, with the measurement of the associated workload and the weight in the assessment. This would be an important help in understanding (and quickly decide on) that workload.

2. How to validate the student's evaluation mechanisms

Teachers' difficulty in implementing evaluation mechanisms: this was clearly the most complex aspect. The evaluation, mainly based on tests, made the transition from the classroom context to the DL format not easy. There were situations as disparate as the obligation for students to keep the camera on and record assessments – which raised data protection issues – even in the situations where the tests were sent to students' e-mails and they had a day to complete it. Thus, it was necessary to give some guidance to teachers and make some recommendations such as tests with consultation and/or tests on digital platforms. But the change process was so fast that adaptation was naturally slow, with some constraints, typical of a new process. In spite of everything, the enormous teachers' effort of adaptation stands out. It was, also on their part, a very significant investment and, in most situations, with very positive results.

3. How to consolidate the formal participation of the students and coordination structures in the monitoring of the teaching and learning process

Another difficulty that it was possible to detect during this period of exception was the difficulty to formalize students' participation throughout the monitoring process. The fact that the structures in which they are represented (Student Association, Schools management bodies, Course Evaluation and Monitoring Committees, Course Commissions, and the QMS itself, among others) are too rigid, in "emergency situations", they prove to be not very flexible and with limited action capacity, which caused the need to revise its framework, in order to enhance the students' intervention.

Improvement Areas

The plan allowed IPS not only to follow its response to emergency situations, as happened with the current pandemic, but also to know better the pedagogical activities and resources used in the teaching and learning process, with several implications for the performance of its QMS. Thus, the questions raised during this process allowed the identification of two important topics of reflection, beyond DL, which also allowed the identification of some areas for improvement:

- How does the QMS's monitoring of the teaching and learning process allows rapid action mechanisms?
- How do QMS respond more effectively, with enough flexibility, to HE students' needs, improving their academic results?

RAPID ACTION MECHANISMS

a. Flexible Organizational Structure of the QMS

Being the QMS based on well-defined responsibilities, it is considered that making it more flexible will be advantageous, in operational terms. To explain this, the authors refer two examples: 1) *Less bureaucratic processes*: as it is important the existence of evidences, it is also important that processes can provide quick (and timely) responses, especially in unforeseen situations like a pandemic, and, at this stage, the institution believes that quick responses are the most important; 2) *Effective information management*: without useful information and available in a timely manner, decision-making processes are always slow or poorly reasoned. During the pandemic, IPS found that its QMS's information gathering processes were too slow, so the improvement of this subject was identified as a priority need.

b. Integrated Monitoring of Pedagogical Activities

The QMS integrates a set of monitoring instruments on the teaching and learning process (Courses Evaluation and Monitoring Commissions; Course Monitoring Reports; Pedagogical Surveys; Curricular Unit's Identification, based on academic results and pedagogical surveys' results; Improvement Plans). However, the information available is not integrated and sometimes it differs, depending on where and when it is collected. For this reason, it was also defined as a priority the consolidation of the existing

mechanisms, in order to have more reliable information, so that the monitoring of the processes – namely the ones related with the pedagogical component – can be progressively more consistent.

c. Autonomy in Decision-Making Process

IPS identified the need to create mechanisms to promote proximity to students, considering their perspectives in decision-making processes, in an effective way. To accomplish that, the institution must guarantee that the mechanisms to implement will be as close as possible to the problems evinced by the students, in order to ensure that it is possible to intervene in a timely manner. Considering the importance of the course coordinators and those responsible for the curricular units, decisions cannot be taken in isolation and should be integrated (and framed) by a coordination process at a higher level of responsibility, where the guidelines must be well defined and very clear to everyone.

EFFECTIVE RESPONSE TO STUDENTS' NEEDS

a. Focus on Students' Needs

IPS has a set of mechanisms for listening its students. But this mechanisms are mainly focused on their perception on teaching-learning process and not on other academic or social spheres of their lives, which can be very limited. For example, dropout situations are often related with economic difficulties that require many students to have a professional activity, so having mechanisms to better understand the students' real needs is essential. So, having formal and integrated mechanisms to better understand the (real) students' needs is an essential element to identify this type of situations and act in useful time, if necessary. It is also essential that students' participation, both in the management bodies and in the QMS, would be more effective and also more recognized by teachers and the academic community in general, ensuring that their perspectives were effectively considered and implemented.

b. Students' and Teachers' Engagement

There is the need to create more and better mechanisms for students to participate more actively in the institution's academic life. The development of formal instruments and proximity mechanisms between course coordinators, teachers and students – and even among the students themselves – is something that is fundamental. Integration programs, tutoring activities, volunteer activities, actions with the academic community and integration activities among students during and since the first year, are some examples. Only with the students' involvement from the moment they enter the institution is it possible to enhance their collaboration both in improving measures and in participating in decision-making bodies and processes.

c. Continuous Improvement

Continuous improvement is a very important buzzword, but in the case of the teaching-learning process it is an effective challenge. What does it represent effectively? How is it measured? How does the institution know if the process is really improving? There are two essential aspects. On the one hand,

it is important to assure an effective monitoring of ongoing assessments. What happens today is that continuous assessments are essentially individual processes, enabling a global view of the student. That is why it is so important to be able to clearly understand students who are struggling, both in terms of attendance and in terms of approval in the evaluation process. On the other hand, it is essential to have a longitudinal analysis of the results (academic results, surveys, meetings, etc.) of the problems identified. Being able to understand how the results evolve over time is essential to understand whether the processes of continuous improvement are in fact happening.

Future Challenges

In a context of uncertainty about the times to come, QMS in higher education face significantly greater challenges than they have hitherto. Thus, and among the different challenges that are presented to them, the most important will certainly be the need for these systems to progressively abandon the procedural logic and focus, more and more, on the students' real needs and expectations. Students who are, at the same time, internal actors – capable of making decisions and directing the internal processes of the HEI – and external actors, as users and clients of the services of these organizations. For these reasons, it is essential that HEI increasingly see students as the true focus of their activities, with emphasis on those of its QMS.

This intervention in the mechanisms of quality management and assurance will necessarily pass – either in the case of the IPS, or in the case of other HEI in which the same limitations are observed – by a concerted action at two levels: by the operationalization of *rapid action mechanisms* and by the *effective response to students' needs and expectations*. With regard to the former, it will be important to ensure greater flexibility in the organizational structure of the QMS, integrating, on the one hand, the effective monitoring of pedagogical activities (as a fundamental area of the HEI) and, on the other, guaranteeing autonomy in the decision-making process, ensuring that the mechanisms implemented are as close as possible to the situations experienced by students, in order to allow their effective responses, in a timely manner.

In turn, and with regard to the effective response to the needs and expectations of students, it is essential that HEI maintain (and increasingly enhance) their focus on them, fostering *students' and teachers' engagement* and *continuous improvement* through monitoring of ongoing assessments and longitudinal analysis of the results of the problems identified. Only this way, with a concerted action, and necessarily framed by the QMS, it will be possible to make these systems to effectively contribute to the improvement of the processes and activities of the HEI, but above all, to the fulfillment and satisfaction of the expectations of HEI main stakeholders.

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ENDNOTES

* March 2021

† Academic Degrees And Higher Education Diplomas (Decree-Law No. 74/2006)

¹ Portuguese Legal Regime of Higher Education Institutions (Law n° 62, 10/9/2007)

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- ² Portuguese Legal Regime of Higher Education Institutions (Law n° 62, 10/9/2007) – Article 12, p.6360

Chapter 20

Good Leadership Practices in Contexts of Unpredictability

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ABSTRACT

COVID-19 was declared the pandemic on 11 March 2020, and the world is still in the throes of an unprecedented and highly unpredictable public health crisis, with consequences at an individual, group, organisational, and societal level. Under such dire circumstances, leadership is of decisive importance, as the repercussions of the decisions taken may, now more than ever, be crucial. Hence, leadership is currently essential not only for the success, but for the actual survival of organisations. In a scenario of ongoing change with unforeseeable outcomes, the absence of good leadership could mean the demise of an organisation. Grounded on the theory of responsible leadership and the theory of shared leadership, the authors present the good leadership practices that are considered essential during times of major unpredictability such those currently underway.

INTRODUCTION

The World Health Organisation declared Covid-19 a pandemic on 11 March 2020. The disease broke out in China in December 2019 and three months later, by March of the following year, it had already spread to 114 countries (World Health Organisation, 2020). This disease had led to one of the most unpredictable public health crises of recent times (Fernandez and Shaw, 2020). The pandemic knows no limitation in terms of time or space. Our health and our freedom are dependent not only on the actions of every one of us as individuals, but also on the actions of others (Forester and McKibbin, 2020). The pandemic affects public health at a global level and has widespread effects on all aspects of personal life (Nicola et al., 2020a). It is expected that not only will there be consequences in terms of physical health, but also on the mental health of those affected, with an increased number of cases of anxiety, depression,

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substance abuse, domestic violence and child abuse (Galea et al. 2020). The social and economic life of individuals and organisations are changing substantially (Sutkowski, 2020), with this pandemic evincing repercussions in the primary, secondary and tertiary sectors (Nicola et al., 2020b), clearly meaning that the pandemic crisis has impacts at the group, organisational and societal level.

In this context, the consequences of good or bad leadership are now, more than ever, of vital importance (Wilson, 2020). Leadership is currently essential not only for the success, but also for the actual survival of organisations. In a scenario of ongoing change with unforeseeable outcomes, the importance of good leadership is intensified (Woszczyzna et al., 2015). The development of better leadership for organisations and for society has become a crucial issue.

The literature reveals that the phenomenon of leadership has been a subject of interest for many decades now in academic circles, with various paradigms and approaches having emerged over the years.

Among the most recent theoretical approaches to leadership, responsible leadership and shared leadership are of particular interest.

The core thesis of responsible leadership lies in the idea that the power and influence of leaders should be used “to improve everybody’s lives, rather than contributing to the destruction of the value of individual careers, organisations, economies and societies” (Marques et al., 2018, p.3). Responsible leadership has been approached from two perspectives. From one angle associated to an ethical phenomenon and, from another viewpoint considering the consequences of the actions of leaders. The first perspective considers that responsible leadership is understood as “the social-relational and ethical phenomenon, which occurs in a social process of interaction” (Maak and Pless, 2006a, p. 99). The second perspective argues that responsible leadership could be defined as “the consideration of the consequences of one’s actions for all stakeholders, as well as exertion of influence by enabling the involvement of the affect stakeholders and by engaging in an active stakeholder dialogue” (Voegtlin et al., 2012, p.59).

Another equally recent approach to leadership in the literature is that of shared leadership. According to Welman (2017), shared leadership involves a change in the way that it is conceptualised as this approach views it as phenomenon that is socially constructed among the members of a team. However, the literature offers various definitions of shared leadership. Despite this diversity, Zhu et al., (2018) argue that there are three key elements in the different definitions of shared leadership: lateral influence between peers; the emergence of a group phenomenon; and the dispersal of leadership roles and influence among the different team members.

This chapter aims to demonstrate how in moments of crisis, such as that experienced since the beginning of the Covid-19 pandemic, which forced organisations to make a tremendous effort to reconfigure their functions, very often shifting to remote operations, the answers offered by traditional leadership paradigms might not be the most appropriate for organisations, and how, to the contrary, models of responsible leadership and shared leadership provide more effective tools.

Hence, this chapter begins with a review of the main paradigms and approaches associated to leadership. We shall subsequently focus our attention on two more recent approaches to this phenomenon, those of responsible leadership and shared leadership. Finally, based on these theories, we shall demonstrate how they could contribute to constructing a set of good leadership practices in the present scenario.

BACKGROUND

Leadership

The phenomenon of leadership has aroused a certain curiosity from time immemorial. The challenge of fully grasping the phenomenon of leadership and building a theoretical framework has led to the emergence of different paradigms and approaches, exploring diverse aspects in which the leader's influence, the relationships and effects established by the leader's action are projected in organisational contexts. Traditionally, leadership has been conceptualised as a skill at the individual level (Day, 2001).

Over the last few decades many definitions of leadership have been presented, demonstrating the importance of leadership in modern organisations and the impact of effective leaderships on organisational performance.

Aimed at systematising our knowledge on the topic of leadership, Avery (2004) came up with a proposal of heuristic value, in which the evolution of our knowledge about this subject is structured around the paradigms underlying the different theoretical approaches associated to it. Thus, according to the author, the different approaches can be classified in four distinct paradigms: Classical, Transactional, Visionary and Organic.

Following Avery (2004), the holistic perspective suggested by Bass (1985), in considering the phenomenon of leadership in terms of a *continuum*, contributed to systematise the basic features and the temporality that characterise each of the listed paradigms.

Avery (2004) identifies the elements that characterise and distinguish each one of these paradigms, enabling a comparison between them according to a set of criteria collected from the extensive literature on leadership. These criteria consider the historical period, the basis of leadership power, the source of the leader's commitment and the leader's vision. The author argues that the classical paradigm extended from antiquity right up to the 1970s. Its bedrock would lie in the respect for or exercise of power of command or control. Fear of and respect for the leader would represent ways of obtaining rewards or avoiding punishment. The leader's vision would be irrelevant in the followers' consideration of accepting their leader. The transactional paradigm flourished from the 1970s up to the 1980s. Here, leadership would be based on the interpersonal influence and consideration of the follower for the leader. The negotiated rewards and the management of expectations would underlie the leadership's strength. The leader's vision was not considered an essential element. The visionary paradigm was applicable from the mid-1980s up to 2000. The basis of this leadership lay in the inspiration emanated by the leader and absorbed by the followers through their emotions. The leader's charisma contributes to the followers' engagement. Individualised consideration is crucial and followers may even contribute to the leader's vision. Finally, we come to the organic paradigm enforced since the early days of the twenty-first century, based on consensual decisions, where the leader may emerge not necessarily through formal appointment. The self-determination of the leader is fundamental. The vision emerges within the group, being a strong cultural element (Avery and Ryan, 2002).

Table 1. Leadership paradigms and their features

Leadership Paradigms/ Features	Classical	Transactional	Visionary	Organic
Historical Period	From antiquity right up to the 1970s.	From the 1970s to the mid-1980s.	Mid-1980s up to 2000.	After 2000.
Basis of Leadership Power	Through respect for or exercise of power of command and control.	Interpersonal influence and consideration of the follower for the leader	The leader inspires the followers through emotion.	Decisions in the group by consensus. The leader may emerge not by formal appointment.
Source of the Leader's Commitment	Fear of or respect for the leader as a way of obtaining rewards or avoiding punishment.	Negotiated rewards, agreements and management of expectations.	The leader's charisma contributes the followers' engagement. Individualised consideration.	Acquired in the context of shared values and processes within the group. Self-determination.
Vision	The leader's vision is not required to obtain the follower's acceptance.	The vision is unnecessary and might not even be conveyed.	The vision is central. The followers may contribute to the leader's vision.	The vision emerges within the group and is a strong cultural element.

Source: Adapted from Avery (2004). *Understanding Leadership – Paradigms and Cases* (p.18).

Avery (2004) also identifies the elements that characterise and distinguish each one of these paradigms, thus enabling a comparison between them based on a set of criteria: key players, knowledge base of the followers, sources of the leader's power, the follower's power, the decision-making process, management in relation to the leadership, principles of management of complexity, cultural aspects, diversity, adaptability, responsibility and accountability, structural features and contextual features. Table 2 presents a systematisation of the criteria associated to each paradigm, along the lines proposed by Avery (2004).

For Avery (2004), particular attention should be given to the cultural aspects. In fact, the literature portrays a growing interest in the role of leadership in different cultures (Avolio et al., 2009). This is illustrated by the Globe Project (House et al., 2004) which is one of the most ambitious studies in this regard. In this project an integrative theory was proposed, developed around the central idea that the attributes of a given culture are indicators of the leadership style and organisational practices in that culture (Javidan et al., 2006).

Avery (2004) also draws a distinction between the leadership approaches and theories at a micro level, in which the spotlight is directed at the leader or the leader-follower relationship, and those analysed at a macro-level, incident on the context in which the leader-follower relationships develop.

Two lines of approach are distinguished in the micro-level analysis. In one of these lines, we find approaches based on a rational vision of leadership, in which the management of others does not necessarily include the leader's emotional engagement. Here, the dominant idea is of rationality and the Newtonian and Taylor's vision of the organisation as a machine. Along the other line are approaches based on the prominence of organisational non-rationality, considering the subjective elements (emotions) in the leadership and the relationships that they establish with the followers in that context.

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Table 2. Comparison between the paradigms of leadership

Leadership Paradigms/ Features	Classical	Transactional	Visionary	Organic
Key players	Leader	Leader	Leader	Group
Knowledge base of the followers	Low	Low to high	Medium to high	High
Sources of power of the leader	Position, reward, coercion, expertise, certification	Position, reward, coercion, relational skills, bargaining power	Position, accredited, expertise, vision, charisma, emotional influence	Expertise, collaboration, sharing of power, primus inter pares
Power of the follower	Almost none	Low	Medium	High
Decision-making process	Decision-making centred on the leader	The leader consults and then takes the decision	The leader collaborates	Group decision
Management versus Leadership	Management	Management	Leadership	Shared leadership
Principles of management of complexity	Newtonian, low complexity, strong control of the leader	Newtonian, low complexity, strong control coming from the leader	Newtonian and new science, medium complexity, shared control	New science, high complexity, low control, self-management
Cultural aspects	*High ** High *** High **** Low	*Low or high ** Low the high ***High **** High	*High or low ** Medium *** Medium **** Medium	All low
Diversity	Low	Medium	Medium	High
Adaptability	Fast via the leader's orders issued to the followers	Slow, because the followers need to be heard and influenced	Slow, as it is necessary to modify mindsets and bring people to accept a new vision	Could either be agile (everyone is always prepared to change) or slow (excessive brainstorming required)
Responsibility and accountability	High for the leader, the followers just carry out the tasks	High for the leader, but the followers are accountable (partial results)	High for para the leader, the followers are accountable for their results	High for all
Structural features	Simple, bureaucracy	Simple, bureaucratic, departmentalised	Adhocracy, departmentalised	Adhocracy, network
Contextual features	Simple, stale	Simple and stable	Simple, complex, stable/dynamic	Complex and dynamic

*Level of inequality in relation to power; ** Level of distancing relative to uncertainty; *** Level of masculinity; **** Level of individualism.

Source: Adapted from Avery (2004). Understanding Leadership – Paradigms and Cases (pp.39-40).

In the first analytical line, the approaches tend to merge in terms of scrutiny of the leader (Weber, 1947), of the leader's characteristics (Stogdill's, 1948) and of the leader's behaviour (Yulk, 1981), where it is considered that the leaders can be trained to develop effective behaviour directed at guidance of tasks and relationships. In the leader-follower approach (LMX – Leader Member Exchange Theory) the relationship between the leader and the followers varies in intensity and quality according to how the leaders treat the followers (Breukelen et al., 2006). In the socio-cognitive approach, the follower is

assigned an important role in the perception of leadership. Accordingly, the analysis of the followers' mental process is the core focal point as it is in that very process that the idea of leadership is formed.

Contingency theories emerged during the 1960s and 1970s. According to Avery (2004), these theories continued to be centred on the leader, but considered the context relevant because the leader's behaviour will depend on the contingencies arising from that context. For example, the situational leadership approach places the focus on the adjustment between the leader's behaviour and the follower's needs (Avery and Ryan, 2002). This approach gave rise to the transactional theory (Bass, 1990).

The transactional theory of leadership is viewed as "an instrumental process of exchange between leader and subordinates, in which the leader defines and clarifies precisely what the subordinate has to do in order to achieve the intended results (e.g. elucidating the subordinate's role), identifies the needs of the subordinates (e.g. materials, career progression, training, acknowledgement, status, etc), promises and allocates rewards according to the results obtained in performing the defined role, e.g. the leader allocates rewards that have previously been agreed with the subordinate in view of the results attained" (Santos and Caetano, 2007, p. 179).

In addition to the transaction theory, we also highlight the contingency theory drawn up by Fiedler (1997), based on premises that the leader's style is stable and that peoples' motivational grounds do not change rapidly. Lastly, reference is made to House's path-goal theory (House and Evans, 1996), based on a model of the motivation of expectations, in which people make rational choices for their behaviour according to their individual perception of the effort they will be required to make in order to achieve the results.

In another analytical direction, which stresses subjective and relational features, the concept of emotional intelligence developed by Salovey and Mayer (1990) emerged through Goleman (1995) concerning aspects of the leader's profile – intelligence (skills), attitudes, talent (abilities) and competence (competencies), as well as clarification of the concept of emotional maturity. The concept of charisma also returned to the forefront.

Towards the end of the 1980s, in the context of the emotional theories of leadership, Hater and Bass (1988) proposed the transformational theory. This is defined as a process in which the leader drives the subordinates to surpass the stipulated standards of performance and exceed expectations. This process is based on a strong identification of the subordinates with the leader by virtue of a series of attributes and behaviours that generate feelings of trust, admiration, loyalty and respect in the subordinates (Hater and Bass, 1988). This theory is grounded on three assumptions. The first assumption recognises that the phenomenon of transformational leadership occurs at all leadership levels; the second asserts that transformational leadership is integrative as it incorporates elements of the visionary, charismatic, emotional and inspirational theories; and the third maintains that the theory of transformational leadership is not intended to be absolute, admitting that in certain circumstances transactional leaders could be more indicated.

The characteristics of a transformational leader consist of idealised influence or charisma, individualised consideration, inspirational motivation and intellectual stimulus (Judge and Piccolo, 2004; Santos and Caetano, 2007). Judge and Piccolo (2004) argue that idealised influence or charisma refer to the extent to which the leaders' behaviour is admired by their followers, making them identify with the leaders. Individualised consideration refers to the extent to which leaders meet the needs of their followers. Inspirational motivation refers to the extent to which their vision is appealing and inspirational to their followers. Finally, intellectual stimulus refers to the extent to which the leader accepts risks and requests the ideas of the followers.

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Leaving the micro-level analysis aside, we now address the macro-level approaches to leadership. Here, leadership is characterised based on the notion that it is in the particular context that the different situational variables with impact on the study of leadership should be examined. A systematic approach to leadership along these lines is proposed by Krantz (1990) focusing on the external subsystems that influence the leader's capability and exercise of leadership. However, the difficulties experienced in the study of leadership according to this systemic perspective contributed to the appearance of other approaches. For example, the substitutes for leadership theory (Dione et al., 2006) argues that there are various persons in the system and larger scenario who actually diminish the leadership's intervention capacity and in a certain manner substitute the leader. The self-leadership approach (Neck and Houghton, 2006) considers that if the people in an organisation are trained towards self-leadership and the overlap of the organisation's interests and those of the individuals is relatively close, then the leader's role diminishes.

All these leadership theories and approaches have undoubtedly contributed to a better understanding of the phenomenon of leadership. But to what extent can they offer more effective solutions in situations of extreme unpredictability such as those currently being experienced where no one dares to produce forecasts or delineate strategies even for the short-term?

Indeed, we have been living in a pandemic context for over a year now and it is becoming increasingly difficult to imagine that anything vaguely positive could emerge from this crisis. This scenario has affected countries, economies, organisations and people, with consequences that are as yet not entirely determinable. A crisis such as that currently being experienced destabilises organisations and their workers (Boin, 2005), forcing leaders to redesign their responses in order to assure the survival of their organisations (Biddle, 2020).

Among the different professionals, those of the health sector have probably been the ones that have faced the greatest challenges, with excessive workloads alongside the psychological burden derived from fear of infection intertwined with the fear of infecting others (Lui et al., 2020). Zhang et al. (2020), where it has been concluded that 28% of health professionals have experienced anxiety disorders. Hamouche (2020) also notes that Covid-19 has posed an enormous challenge to health sector workers with consequences on their physical and psychological wellbeing.

But health sector workers are not alone in being confronted with tremendous pressure and challenges. As suggested by Bader et al., (2019), disaster scenarios have repercussions on the performance of different types of workers. The pandemic is a global crisis whose repercussions affect all players involved, creating a high level of interdependence among all (Ansell et al., 2020). Balanagalakshmi et al., (2020) indicate that for about 22% of workers, the pandemic has negatively affected their wellbeing at the workplace. Carnevale and Hatak (2020) also draw our attention to the major changes that many organisations and their workers have had to face by shifting, in a very short space of time, to working remotely. This change has sometimes had negative consequences, for example, in the difficult separation between professional and personal life (Chawla et al., 2020).

Thus, in periods of crisis, organisations work under pressure, facing a series of challenges that the leaders must successfully address (Dirami et al., 2020). And one of these challenges is that of finding suitable strategies to deal with the crisis and mitigate the impact of the adversities on the stakeholders. It is fundamental for the leaders to be able to inspire in people "a sense of hope for 'future goodness' and dignity, to be guardians of radical hope and see into the future (Maak et al., 2020). This is certainly not a time for leaders to ignore the needs of those they lead. Some authors indicate that we are witnessing, somewhat all over the world, what Padilla et al., (2009) call toxic leaderships in which the search for answers in our tried-and-tested paradigms actually ends up by preventing us from discerning sustainable

leadership solutions (Clegg et al., 2021). Narcissism and ideological rigidity ultimately affect the leaders' ability to resolve the issues inherent to their position in a manner that is ethical and empathetic with their employees (Maak et al., 2021), with Trump and Bolsonaro being paradigmatic examples of this.

Leadership is clearly crucial in society but, in order to be effective and able to rise to our current challenges, it will have to change (Maak et al., 2021). As noted by Clegg et al., (2021), "Several aspects of this crisis should inform any theory or account of leadership. First, the focus on the leader alone is insufficient".

Rost (1991) argues that the industrial paradigm of leadership based on male, technocratic, quantitative, cost-benefit sustained, personalist, hierarchical, short-term driven and materialistic management has long given way to another paradigm in which responsible leadership features strongly.

Could the theory of responsible leadership, in articulation with other more recent theories, such as the theory of shared leadership, help us to respond more effectively to the challenges that are presently placed before us? The essential features of each theory will be described below so that we can understand their potential in contexts of unpredictability.

Responsible Leadership

In the mid-2000s the concept of responsible leadership started to attract the attention of the business world. The publication of the book entitled "Responsible Leadership" by Maak and Pless (2006b) greatly contributed to this outcome.

The importance of this topic is growing with the worldwide questioning of the existing disparity between what leaders are expected to do and what they have actually done (Broadberlt, 2015). In this regard, the ethical crisis afflicting organisations all over the world has put leadership in the clear forefront of research on business ethics (Frangieh and Yaacoub, 2017). According to these authors, the role of leadership should not be underestimated as leaders are determinant in stories of success and failure everywhere and are obviously preponderant in defining the ethical conduct of organisations.

Before delving into the concept of responsible leadership, it is important to consider what we mean by responsibility. Waldman and Galvin (2008, p.328) state that responsibility "is geared toward the specific concerns of others, an obligation to act on those standards, and to be accountable for the consequences of one's actions". This definition implies understanding just who are the "others", which requires looking at this issue from two angles: the economic perspective and that of the stakeholders.

Waldaman and Galvin (2008) assert that the economic perspective suggests three basic principles. The first principle being that leaders should take into account that their responsibility begins and ends with the shareholders and owners. The second principle is that responsible leadership should be highly strategic and calculable. The third principle is that the rewards and monitoring systems should work towards ensuring that that leaders effectively define their responsibilities with the shareholders and owners.

The stakeholder perspective considers that leaders are responsible for taking into account the shareholders, workers, clients, consumer groups and the community in general. Waldman and Galvin (2008) argue that these two perspectives are pertinent, meaning that when leaders take decisions, they should consider all the stakeholders, both internal and external.

It should also be clarified that the stakeholder theory draws a classification that distinguishes between primary stakeholders and secondary stakeholders. Primary stakeholders cover clients, researchers, workers and shareholders. Usually there is a high level of interdependence between these stakeholders and the organisation (Voegtlin et al., 2019). Secondary stakeholders refer to non-governmental organisations,

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local communities and social groups. As a rule, these stakeholders influence or affect or are influenced or affected by the actions taken by the organisations, but do not conduct transactions with the organisations (Clarkson, 1995).

Responsible leaders should consider both the primary and secondary stakeholders as they have to collaborate and cooperate with all, establishing relationships of trust. And the leaders' decision-making will inevitably have direct or indirect repercussions in the sphere of all the stakeholders.

But what does responsible leadership actually mean? Despite being such a recent topic in the literature, there are various definitions of responsible leadership. Responsible leadership is usually defined from two viewpoints (Roque and Ramos, 2019). The first perspective views leadership as an ethical phenomenon and the second is associated to the notion of responsibility in the leader's actions. Considering the first perspective, responsible leadership could be defined as "values-based and through ethical principles driven relationship between leaders and stakeholders who are connected through a shared sense of meaning and purpose through which they raise one another to higher levels of motivation and commitment for achieving sustainable values creation and social change" (Pless, 2007, p.438). The relationship between the leaders and those who are affected by their leadership is seen from an ethical point of view and as developed through a process of social interaction (Maria and Lozano, 2010). Doh and Stumpf (2005) also emphasise ethical values and good relationships in interactions with stakeholders. For these authors, the concept of responsible leadership requires meeting three conditions: leadership should be based on values, decision-making should have ethical undertones; and there should be quality stakeholder relations. This perspective places the focus on the relationship between the leader and the stakeholders, guided by ethical values (Pless and Maak, 2011). Thus, leaders should build and cultivate sustainable relationships with stakeholders aimed at attaining common goals designed to benefit many and not just a restricted set of individuals (Maak, 2007).

The second perspective considers responsible leadership "as the consideration of the consequences of one's actions for all stakeholders, as well as the exertion of influence by enabling the involvement of the affect stakeholders and by engaging in an active stakeholder dialogue. Therein responsible leaders strive to weigh and balance the interests of the forwarded claims" (Voegtlin et al., 2012, p.59). For the authors, the definition of responsible leadership is equivalent to saying that leaders should take into account the consequences of their actions both for the organisations and in the broader sense outside those organisations. Likewise, Marques et al. (2018) consider that the leaders' power should be used to improve the life of individuals, regardless of whether they are internal or external to organisation. Similarly, Haque et al., (2017) see the notion of responsibility as fundamental.

Waldman and Galvin (2008) also distinguish two possible visions of responsible leadership, based on the leaders' behaviour: the limited economic view and the extended stakeholder view. The first perspective considers that the leaders' decisions should be solely focused on maximising value for the stakeholder. The second perspective (Stahl and Luque, 2014) considers that the leaders' decisions should be more comprehensive, differentiating two levels in responsible behaviour: avoiding harm (proscriptive morality) and doing good (prescriptive morality). Avoiding harm refers to decisions that prevent bad consequences for the stakeholders and for society, while doing good covers contributing to improve society. Stahl and Luque (2014, p.238) define the behaviour of a responsible leader as "intentional actions taken by leaders to benefit the stakeholders and the larger society", in line with proscriptive morality.

According to Maak and Pless (2011), the whole point of responsible leadership is to create relationships of trust with the stakeholders, achieve common goals and, at the same time, share the business vision. For these the authors, five aspects must be taken into account for these goals to be attained: 1)

responsible leadership should consider the stakeholders within and outside the organisation; 2) responsible leadership has goals both in organisational and societal terms; 3) responsible leadership is based on inclusion, collaboration and cooperation with the different stakeholders; 4) responsible leaders take decisions taking into account the impact on all stakeholders; and 5) responsible leaders are proficient in harnessing change as a way to achieve higher social goals.

Liechti (2014) argues that the action of responsible leaders should cover five specific competency dimensions: (1) stakeholder relations; (2) ethics and values; (3) self-awareness; (4) systems thinking; and (5) change and innovation.

Euler and Hahn (2007), as cited in Muff et al., (2020) probe deeper, suggesting that in each of these areas three further domains must be considered: knowledge, skills and attitudes.

Concerning stakeholder relations, the knowledge domain should cover methods to integrate the different stakeholders and deal with their different interests. The domain of skills includes moderation, consensus and the ability to build long-term relations. The domain of attitudes involves empathy and the desire to be of assistance to others (Muff et al., 2020).

In the area of ethics and values, the knowledge domain covers the grasping of dilemmas, knowing right from wrong and understanding these values. Skills refer to the ability to be critical and the ability to act in an ethical and value-based manner. The attitudes domain covers being honest, integer and responsible (Muff et al., 2020).

The dimension of self-awareness refers to the importance of reflection throughout the entire process and knowledge of one's self (including emotions, interests and needs). The skills domain covers the ability to learn from one's mistakes and reflect upon one's own behaviour. Skills concern the ability to share the challenges of one's own development (Muff et al., 2020).

In thinking systems, the knowledge domain requires understanding how the system works, grasping the interdependencies and interconnections as well as the opportunities for sustainable change. Skills refer to the ability to deal with complexity and ambiguity, foresee the consequences of decisions in the system. Attitudes involves working in various subject areas, advocating a long-term vision (Muff et al., 2020).

Finally, in the competency dimension of change and innovation, the knowledge domain refers to understanding the meaning of a motivating vision in a process of change, and understanding the conditions, the functioning and the dynamics of the process of change. The skills dimension concerns the development of creative and innovative ideas. Attitudes covers being curious, flexible, able to adapt and be visionary in the search for solutions to problems in general (Muff et al., 2020).

Kempster and Jackson (2021) bring in a new dimension: place. These authors state that, following the proposition advanced by Rost (1991), it is necessary to put aside "peripheral concerns and we seek to enable leadership to become anchored in the responsibilities of leadership – responsibilities oriented to realizing value for stakeholders with a deepened appreciation of the significance of place." (2021, p. 50).

Shared Leadership

The dominant paradigm considers leadership as a command unit, stressing the behaviour and personal traits of the leaders (Bass, 1990; Bass, 2008). This paradigm focuses on the influence that leaders exert on those hierarchically below, i.e., their subordinates (Pearce, 2004). This influence is imbued with formal authority and power (D'Innocenzo et al., 2015). However, over recent years, this leadership paradigm has been called into question with the emergence of other visions about leadership (Pastor et al., 2002). Leadership is beginning to be seen as a more dynamic process where it is considered that

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various individuals can perform leadership roles according to the group's needs (Morgeson et al., 2010). Shared leadership is based on the idea that more than one member of the team can lead the team (Han et al., 2018). The new leadership models define it as that socially constructed among the members of a group and moulded by the group context (Wellman, 2017, p.614). Moreover, a rising number of changes are occurring at a rapid pace, where it is increasingly more difficult for a single individual to be able to grasp the different perspectives on a particular issue and thus take the best decision (Fitzsimons, 2016). It is in this context that the theory of shared leadership emerged.

In sum, shared leadership is not limited to a single individual but rather dispersed among those who influence the collective action (Bilal et al., 2019). These authors note, for example, that in the case of public higher education establishments, shared leadership involves three aspects which are participation in decision-making, communication and power. Shared decision-making implies that an organisation's members can actively participate in taking decisions. Communication implies that all suggestions for improvement of work practices should be heard. And power implies that it should be sufficient to decide upon the best way to carry out tasks in the context in question, a vision also shared by Khasawneh (2011).

Various definitions of shared leadership are found in a literature review, with one of the most feasible being proposed by Pearce and Conger. These authors specify shared leadership as "a dynamic, interactive influence process among individuals in groups for which the objective is to lead one another to the achievement of group or organizational goals" (2003, p.1). Hiller et al., (2006, p.388) state that "The epicentre of collective leadership is not the role of a formal leader but the interaction of team members to lead the team by sharing in leadership responsibilities".

A little later, Pearce et al. (2010, p.151) state that shared leadership "occurs when group members actively and intentionally shift the role of leader to one another as necessitated by the environment or circumstances in which the group operates". Some authors define shared leadership as "An emergent and dynamic team phenomenon whereby leadership roles and influence are distributed among team members (D'Innocenzo et al., 2015, p. 5). While others define it as "The form of leadership that is distributed and shared among multiple participating individuals, rather than being produced by a single individual (Meuser et al., 2016, p.1390). More recently, shared leadership is seen "in terms of how different individuals enact leader and follower roles at different points in time (Lord et al., 2017, p.444).

Despite the differences in the existing definitions of shared leadership, two aspects feature in all of them: the interaction between the different team members and the possibility of a change in the roles of each person in the team, who may shift between being a leader and a follower.

Zhu et al., (2018) detect three common aspects in the definitions in the literature on shared leadership: (1) the existence of lateral influence between peers; (2) it is a group phenomenon; and (3) it requires the roles of leadership and influence to be dispersed among the team members.

The first aspect is related to the sources of leadership associated to teamwork, being most distinct in vertical leadership or in shared leadership (Nicolaidis et al., 2014). In shared leadership, in contrast to vertical leadership, the key element is not the formal leader, but rather the interaction of the team members during the process of leadership of the team (Hiller et al., 2006). In shared leadership the interaction between the different team members is fundamental. It is in this interaction that the team members negotiate the responsibilities inherent to the leadership (Carsom et al., 2007; Zhu et al., 2018). In relation to the second aspect, it should be noted that leadership does not reside in the formal leader nor in any team member but is shared collectively between the team members (Zhu et al., 2018). Lastly, the third aspect is that the leadership's influence cannot be exerted by any particular member of the team (Zhu et al., 2018).

According to Zhu et al., (2018), apart from identifying the common features of the different definitions of shared leadership, it is equally pertinent to answer two questions: i) what is shared? and ii) how does the shared leadership work?

Concerning the first question, there are two lines of investigation. One investigational line argues that almost any type of leadership can be shared (Yammarino et al., 2012). The second line considers leadership generically by aggregating individual leadership in terms of the team (Crason et al., 2007).

In relation to the second question there are also two visions. One considers that the process of sharing can occur when the team members start working together towards leadership activity (Zhu et al., 2018). Another version believes that the process of sharing can develop over time with the team members progressively emerging as informal leaders (Lord et al., 2017).

Various authors refer to the benefits associated to shared leadership. Crevani et al., (2007) classify this at four levels: (1) individual; (2) group; (3) organisation; and (4) societal.

At the individual level, it could be said that individual leadership is actually more absorbing and could contribute to high levels of stress and anxiety. To the contrary, shared leadership enables greater balance between personal and professional life (Fletcher, 2004; Crevani et al., 2007).

At the group level, it could be argued that younger people are used to working in teams with some degree of shared leadership. When these youngsters reach higher hierarchical levels, they tend to choose a more shared leadership style, resisting the temptation of control by a single individual (Sally, 2002; Crevani et al., 2007).

At the organisational level, leadership by a single individual can never reflect the entire complexity manifest in organisations. Indeed, organisations increasingly require very diverse competencies and skills. Shared leadership more easily meets those needs (Crevani et al., 2007). Furthermore, organisations can benefit from the cognitive and behavioural skills of a wider number of individuals (Crevani et al., 2007).

At the societal level, we know that when power is concentrated in the hands of a few this could pave the way to less ethical and more immoral conduct (Lambert-Olsson, 2004). Shared leadership could contribute to inhibiting this type of behaviour as power is more dispersed. In fact, it has never been scientifically proved that the unit of command in the leadership would be the most effective form of leadership (Crevani et al., 2007).

Various other studies conducted up to date on shared leadership offer evidence of the effects that it could have on collective performance (D'Innocenzo et al., 2014; Wang et al., 2014). It appears as a better predictor of success than vertical leadership (Ensley et al., 2006) and strengthens the efficacy of group decision-making (Erkutlu, 2012; Hoch, 2013). Shared leadership is also associated to a set of positive outcomes, such as teamwork, team cohesion, team confidence and trustworthiness, team resistance, team performance, better mental health and wellbeing of the team members (Zhu et al., 2018). The literature also points to a positive relationship between shared leadership and innovation (Hoch, 2013) and likewise between shared leadership and emotional intelligence (Shiji and Pandey, 2020). A study conducted by Pearce (1997,) demonstrated the connection between shared leadership and the prevention of potential acts of corruption.

Good Leadership Practices at Times of Major Unpredictability

Unpredictability and change are increasingly part of daily life. The circumstances that we are currently experiencing are proof of this. This type of context requires a reading of reality from diverse perspectives and various solutions. This task could be more difficult when carried out by just one person. In fact, each

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context has its own particularities and in order for its interpretation to be appropriate to meet the needs of the moment, different perspectives must be considered which is more arduous for a single individual.

There is a rising need to integrate unexpected situations in organisations, with unplanned changes appearing to prevail over planned changes. Flexibility and the adaptability are crucial for the response of organisations. For leadership, flexibility and adaptability are reflected in the taking of the best decisions.

The features associated to shared leadership thus become relevant in this type of context, especially because decision-making is no longer dependent on a single person as there may be a distribution of the functions inherent to the leadership (Tafvelin et al., 2019).

In circumstances of unpredictability and complexity, of rapidly ongoing change, the individual may simply not be able to provide the best response in view of the difficulty of foreseeing and analysing the manifold perspectives (Fitzsimons, 2016). Shared leadership could constitute an alternative to leadership exercised by a single person, enabling the different issues that continuously emerge to be examined from various points of view, thus increasing the chances of a suitable response to the arising difficulties and uncertainties. Kang and Ha (2019) point precisely to the existence of an association between share leadership and organisational capacity, organisational performance and innovation.

In a study conducted recently, among health professionals in Spain, who work in a Covid-19 unit, Vanilla et al., (2020) conclude that the high degree of exchange of information and collective coordination, as well as collective support, proved to be crucial for the low levels of contagion in that unit. The advantage of shared leadership is also advocated by Clegg et al., (2021), who argue that in organisations and very specifically in leadership it is increasingly necessary to encourage collaboration within teams.

The distribution of functions inherent to the leadership over various members of the group should consider the different areas of knowledge and skills of each of these members, enhancing the possibility of sound decision-making. A sound decision is one that takes into account the diverse scenarios as well as the impact of the decision on the entire surrounding environment, from that closest to the most distant.

Along these lines, a recent study conducted by por Love et al., (2020), concluded that an environment centred on shared leadership and on the creation of value is required for the transition to a new leadership paradigm where, in addition to the production of economic benefits, the surrounding environmental benefits must also be included. Shiji and Pandey (2020) refer to an association between shared leadership and emotional intelligence, where the latter is essential to assess our own feelings and the feelings of others, which, in a context of crisis, proves to be extremely important.

Responsible leadership can also contribute to good leadership practices in times of major unpredictability. As noted above, one of the premises of this theory is grounded on the relationship of trust established with the stakeholders. This relationship will be built around inclusion, collaboration, and cooperation. While clearly essential at all times these aspects are even more important during periods of uncertainty as they strengthen interaction and the possibility of mutual help between all the stakeholders, whether internal or external, making it easier to achieve common goals. But, if collaboration is fundamental to attain common goals, it is equally important to consider the potential impacts of decisions in general terms. For such, it is necessary to intensify the value given to actions with a stronger ethical dimension.

Various studies provide evidence of the relationship between responsible leadership, shared leadership, and the efficient management of organisations. A study conducted by Haque et al., (2008) demonstrated that responsible leadership can boost the workers' commitment. In a new study, currently underway in the health area, Haque (2021) reveals that responsible leadership directly impacts organisational sustainability and the wellbeing of the workers, leading to greater satisfaction of the patients and better performance by the professionals in the present context.

Likewise, a study carried out by Mousa and Puhakka (2019) in Egypt, in which 360 doctors participated, unveiled a positive association between responsible leadership and organisational commitment, between responsible leadership and organisational inclusion. Organisational commitment is a psychological tie that links the workers to their organisation, having a strong impact on their decision to remain at the organisation. In addition to reducing intentions to leave, organisational commitment affects organisational efficiency. In view of the current context that we are experiencing, it is hardly difficult to consider the importance of nurturing the workers' commitment, particularly among the workers of the health sector. Naturally, the leader's role is fundamental in this task.

Zhao and Zhou (2019) demonstrated that responsible leadership is an essential precondition for the development of organisational citizenship behaviour, which is crucial as it contributes to the effective functioning of organisations. And Voegtlin et al., (2019) suggest that leaders who act responsibly are able to achieve particularly positive outcomes in contexts in which the business confidence is lower, as under our present circumstances.

Afsar et al. state that "Compared with traditional leadership from the dyadic leader-follower perspective, responsible leadership contributes to the improvement of personal sustainable behavior, regarding employees as key stakeholders. Therefore, organisations with responsible leaders should generate superior sustainability practices due to their emphasis on aligning a responsible leader's perspectives or beliefs with the internal personal environment efforts (2019, p.308).

Thus, taking into account the various principles underlying the theories of responsible leadership and shared leadership, and following Lietchi (2014) on the actions of responsible leaders, we present a proposal for good leadership practices in times of unpredictability. We believe that in contexts of major unpredictability the action of leaders should be based on five principles: (1) consider that leadership can be shared by various individuals; (2) valorise diverse competences and skills; (3) strengthen the relationship of trust with the stakeholders based on inclusion, collaboration, cooperation and communication; (4) appraise the impact of the decisions taken on all the stakeholders; (5) valorise the ethical dimension in decision-making.

Let us look at each one of these principles in particular. The first principle considers that the leadership can be shared by various individuals. Leadership exercised by a single person might not be the most effective way in light of the series of responses that are necessary in a short space of time. Berjaoui and Karami-Akkary (2019) argue that the distribution of responsibilities involving the leadership could be more effective in a crisis. Furthermore, the quality of the decisions could be higher as various perspectives on the question in hand are debated (Kezar and Holcombe, 2017). Moreover, it is probable that the team members will uphold a higher level of motivation as the decisions have greater amplitude (Fernandez and Shaw, 2020).

The second principle establishes that diverse competences and skills should be valorised. This principle follows from the previous one. If the distribution of the responsibilities inherent to the leadership and the inclusion of various perspectives in the debate is assumed, then individuals with different competences and skills must necessarily be included to support a diverse range of perspectives.

The third principle envisages strengthening the relationship of trust with the stakeholders based on inclusion, collaboration, cooperation and communication. Inclusion, collaboration and cooperation gives everyone the right to participate through joint work in which concern for the collective is essential. The leaders should work towards achieving common goals and share their business vision. For example, in view of the present need to comply with social distancing, the leaders' communication should take into account the need to encourage the different stakeholders and, at the same time, consider other means

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of communication that also consider the preferences of these stakeholders (Fernandez and Shaw, 2020). The importance of communication became obvious with the crisis triggered by the Covid-19 pandemic. Leaders must succeed in passing on clear, empathetic and positive messages, but that are also realistic and balanced, that contribute to lower the anxiety and concerns of the different stakeholders. It is also necessary for leaders to explain the path designed to face and overcome the current difficulties. Only in this way, will they be able to gain the confidence of all the organisation's stakeholders (Dirani et al., 2020).

The fourth principle lays down that leaders should ponder the impact of their decision-making on the primary and secondary stakeholders, as all are affected by the actions taken by the leaders in an organisation. Based on the extended stakeholder view, the leaders' decisions should not only prevent harm (proscriptive morality) but also do good (prescriptive morality) (Stahal and Luque, 2014).

Lastly, the fifth principle covers the ethical dimension in decision-making. The credibility and the integrity of the leaders is crucial during times of crisis and unpredictability (Fernandez and Shaw, 2020). Transparency and simplicity in communication are essential for the stakeholders to know precisely what direction will be followed to overcome the issues being faced and which values underlie the decisions taken.

CONCLUSION

The pandemic scenario that we are currently experiencing has visible effects on public health, on the physical and mental health of individuals, on the economy and at many more levels. In organisations, individual wellbeing is also affected, whether by the absence or reduction of work or due to a shift to telework, with the changes that embodies, in particular, the difficulty in drawing a line between work and personal life, feelings of isolation or the lack of sharing of experiences with colleagues. These issues are worrying, as they can be reflected in lower levels of organisational inhouse satisfaction and performance.

This context has clearly strengthened the discussion that existed before the pandemic about the roles of leaders in organisations and in society in general. Leaders are now, more than ever, an indispensable element. The disparity that sometimes exists between what they should be doing and what they are actually doing is increasingly pertinent, with research linked to ethics in organisations and the role of their leaders as drivers of good practices being an expanding field and the role of leadership being an important aspect in research on business ethics.

Our literature review left no doubts as to the advantages of responsible leadership and shared leadership, and their contribution to the management of organisations. The first is that it enables the creation of relations of trust with all the stakeholders based on inclusion, collaboration, cooperation and communication, where decision-making should consider the impact on all stakeholders. In a shared leadership model, the unit of command shifts away from the individual (the manager who influences the others) and towards the different people who can contribute to the overall process of leadership, thus maximising the engagement of all the organisation's human resources.

As demonstrated throughout this chapter, various studies recent studies have reinforced the importance and efficacy of these leadership models in organisational structures during the present context, leading us to believe that our proposition could prove to be useful, as it is underpinned by what the studies related to these topics put forward as being decisive and innovative factors for an efficient management of people for people, especially in circumstances of unpredictability.

Covid-19 has strengthened the idea that leaders should be able to resolve a series of increasingly more comprehensive and profound problems. For this reason, it is expected that a leader should have certain qualities such as, for example, the ability to foster collaboration, cooperation, integration and communication. In practical terms, it is desirable that leaders boost organisational resilience, share leadership, prioritise the employee's emotional stability, by communicating in a clear and honest manner, and acting in an ethical form showing respect for all stakeholders. In other words, leaders should foresee the consequences that their actions could have in the sphere of all the stakeholders, from the workers to the supervisors and the community at large. At the same time, it is important that leaders require those they engage with act in conformity with the same principles.

Hence, a series of leadership good practices have been drawn up that we believe could be beneficial in the present context: (1) leadership shared among various individuals; (2) valorisation of different skills and aptitudes; (3) strengthening of relations of trust with stakeholders based on inclusion, collaboration, cooperation and communication; (4) assessment of the impact of decision-making on all stakeholders; and (5) valorisation of the ethical dimension in decision-making.

We think that it would be interesting, in the future, to explore the impact of both responsible leadership and shared leadership at other levels, beyond the organisational, such as, for example, at a national and even transnational level, and whether the specific cultural atmosphere of each country could have any differentiating effect on the applicability of these leadership models.

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Chapter 21

Impact of the COVID-19 Pandemic on the Secretarial Role in Organizations

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ABSTRACT

The COVID-19 pandemic has brought a global downturn in economic activity, with new social and economic conditions. For executive secretariat professionals, the pandemic has significantly contributed to change the way they operate, their tasks, activity, and importance in the organizations. The present investigation intends to understand the perception of the executive secretarial professionals of companies about the exercise of their profession, before and during the COVID-19 pandemic. Results obtained show that there have been significant changes in the new conditions and requirements inherent to the exercise of the profession, in terms of their competencies and responsibilities, as well in the implementation of new forms of work.

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INTRODUCTION

The work of the executive secretariat professionals began in Portugal in the second half of the last century and, since then, it has undergone several transformations until today. The tasks of these professionals, which were initially considered as simple and routine, have undergone significant changes, largely due to the regulation of the profession and also due to the perception of the importance of the function by the organizational leaders. Several studies show the importance of the secretary/advisor in the performance of organizations, both as an element that supports decision-making and in promoting and managing the relationship between management and subordinates and between the organization and the outside (Maçaneiro & Kuhl, 2013; Sousa, Santos & Nogueira, 2016).

The changing profile of the profession has led secretarial professionals to develop new skills. Today it is required that you have a general and strategic view of the company, in addition to having to solve small daily problems. Thus, in addition to technical skills, these professionals must have behavioural skills, which are increasingly valued.

Currently, we are dealing with yet another global crisis, this time of a sanitary nature, called COVID19, with a negative impact on mortality rates, morbidity, and the ability to perform work duties for a period of time (sometimes, undetermined). The pandemic has also brought a global downturn in economic activity. As a consequence, the new health, social and economic conditions bring new work methods and ways to exercise of the profession.

For executive secretariat professionals, these organizational modifications can significantly contribute to a change in the way they operate. For this purpose, we must take into account that the main activities of these professionals, which traditionally were performed in physical companies, and individually, now cover a large number of employees, who work in more collaborative environments and, often, through digital platforms. These contemporary forms of work often provide executive secretarial professionals with the assistance of a large number of executives and entrepreneurs (Mesquita, Oliveira & Sequeira, 2019).

The growth of more flexible forms of work is characteristic of the 21st century, since widespread access to the internet and technological development make it possible to carry out work activities regardless of where the employee is located.

In this follow-up, it is possible to assess the evolution of the role of the secretarial professional in the organization, as well as the responsibility and tasks that are inherent to it. Accompanying these changes, the growing demand for personal and technical skills is also evident.

Thus, the present study proposal focuses on an investigation that aims to understand the perception of the executive secretarial professionals of companies about the exercise of their profession, before and during the COVID19 pandemic.

The starting question that guides the study is:

“What is the impact of the COVID19 pandemic on the secretarial function in organizations, with regard to the importance, tasks and skills of secretarial professionals?”

In order to answer the starting question, the following research objectives were defined:

1. understand the secretarial professional’s perception of the importance of their role within the organization;
2. list the tasks that the secretarial professional assumes as his/her responsibility;

3. determine which skills the secretarial professional identifies as determining for the exercise of his/her profession;
4. compare the evolution of the function, in terms of importance, tasks and skills of the secretarial professional, in the period before and after the emergence of the pandemic.

In order to understand the most recent dynamics and to respond to the objectives of the investigation, we resorted to the application of a questionnaire survey to employees who work as secretaries in associated companies of the Business Association of the Leiria Region (hereinafter referred to as *NERLEI*), in Portugal. It is, therefore, an empirical study of a quantitative nature.

Analysis of the results obtained on the importance, tasks and skills of secretarial professionals “before the COVID19 pandemic”, in comparison with the results obtained for the period “during the COVID19 pandemic”, allowed to obtain information about the perception of secretarial professionals on the impact of the pandemic on the exercise of their function.

THEORETICAL FRAMEWORK

Below are the main works developed within the scope of the secretarial profession in organizations. Thus, in concrete terms, the work on the evolution and profile of the professional and their respective functions and competencies is followed by the impact of the pandemic COVID19 on the exercise of the profession.

Evolution of the Profile of the Secretarial Professional

The secretarial profession has its genesis in the activity of the scribes, which throughout the Ancient Age developed writing and commerce with the peoples. However, the first records of the secretarial professional date from the times of the pharaohs.

Throughout history, and until the beginning of the 20th century, the profession was eminently assumed by male individuals, but after the two world wars, and with the entry of women into the labour market, women began to gain special relevance (Natalense, 1998).

In the last decades, the role of secretary has undergone enormous transformations, with the reconfiguration of the labour market, due to the growing tertiarization of western economies, technological development, fluctuations in unemployment rates, and the financial crisis, which leads to the emergence of new challenges and responsibilities associated with this function (Bioen, Cielo, Sanches-Canevesi & Lima, 2019).

Thus, the various changes in the organizational world, such as globalization and the technological revolution, led to a change in profile, to the growth of the category and to the repositioning in the job market of the secretary profession (Almeida, Rogel & Shimoura, 2010).

According to Santos (2014), the contemporary secretary will be the professional who develops his/her activity in the area of administrative support and direct advice and who is guided by efficiency, understanding, and systemic vision of the organization where he performs the activity and who contributes in a proactive and assertive way to achieve strategic organizational objectives.

In addition to the day-to-day administrative functions, the secretarial work has been extended to include tasks that presuppose a direct relationship with management/administration, and may even, in some circumstances, assume the representation of the hierarchical superior in internal and external en-

vironment. His/her evolution implied, in terms of the competencies and responsibilities required of the secretarial professional, greater versatility in the activities that he develops and vast knowledge about different areas of knowledge (Santos, 2012a).

With greater autonomy and initiative, the current secretariat is often the “right-hand person” of his/her superior and acts as an advisor, being responsible for the execution of tasks of strategic importance for efficiency and productivity, not only of his/her department, but of the whole organization (Sousa *et al.*, 2016).

Functions and Skills of the Secretarial Professional

It can be said that, currently, organizations are looking for secretarial professionals who are highly qualified and willing to face the challenges of contemporary society, who are able to add new knowledge and work as a team, aiming at the success of the organization as a whole (Santos, 2012b).

This emerging reality will translate into reinforcing the importance of those professionals as mediators between the organization’s stakeholders, internal and external, coordinating and sharing information, communicating quickly and effectively, and managing interactions and conflicts, and, last but not least, they must assume a behaviour based on ethics and confidentiality in the context of all these processes in which they intervene (Bozada-Meza & Rodríguez, 2017; Stroman, Wilson & Wauson, 2014). They are, therefore, professionals endowed, on the one hand, with a greater level of autonomy and, on the other hand, with a greater level of responsibility (Dieterich & Ferro, 2012). On the other hand, Sousa *et al.* (2016) conclude that, in order to perform his/her duties efficiently, the secretary needs to have a global view of the organization.

Santos (2012a) argues that the secretarial professional can assume different functions: administrative functions (which include the more traditional tasks of the secretariat, such as typing, archiving and scheduling meetings); representation functions (serving all agents who interact with the organization); work organization functions (development of new management and work organization strategies); liaison functions (management and organization of information flows); and multipurpose functions (flexibility and ability to adapt to the performance of advisory tasks in the most diverse areas of professional activity). The assumption of a greater or lesser number of functions is often related to the size of the organization (the smaller the dimension, the more diverse the functions and tasks are) with the level of autonomy attributed to it by the hierarchical superior.

This widening of the profession’s functions has led secretarial professionals to develop new skills. Various authors (among which we highlight Amaral, Baldan, Batista, Carmo, Helmer, Silva & Leão, 2012; Ribeiro, Falcão & Simões, 2019; Leal, Souza & Moreira, 2018; Paes, Figueiredo, Lemos & Oliveira, 2019; Müller, Stece & Cegan, 2015) studied the essential skills that a secretarial professional must fulfil.

With market changes, the skills of the secretarial professional provided a migration from the operational field to the organization’s tactical and strategic field, since it has adapted to organizational needs (Paes *et al.*, 2019).

According to Amaral *et al.* (2012), the range of skills of these professionals is based on four fundamental pillars: (1) administrative support, implying knowledge of techniques that encourage the establishment of functional routines; (2) management, applying efficiently and effectively the skills that allow a positive result in terms of organization, planning, monitoring and evaluation of work; (3) entrepreneurship, through the creation, promotion and implementation of solutions that improve work

processes; (4) consulting, through the analysis and understanding of the organizational culture, identifying critical points and proposing improvement strategies.

According to the International Management Assistants cited by Ribeiro *et al.* (2019), the secretarial professional must necessarily have strong technical skills in core areas such as, languages and computer applications, also highlighting transversal skills, such as organization and autonomy. Thus, due to the importance of secretarial professionals within organizations, and in their relationship with the outside world, personal skills, such as emotional maturity, common sense, the ability to manage situations of tension and conflict, are crucial to creating a positive and collaborative work environment, as well as a good image of the organization with external entities. In addition, these professionals must seek to assume a proactive and assertive attitude, assuming an effective support function to the work processes necessary to fulfil the organization's mission.

Leal *et al.* (2018) distinguished two types of skills (technical and behavioural) that are required of executive secretaries, and that allow them to contribute to the management of organizations (in this case, to university management).

For Müller *et al.* (2015), the secretarial professionals started to have, in addition to administrative tasks, other activities such as the coordination of work teams, data and information management, planning and logistical definitions, demanding greater professional autonomy and other skills that were not previously taken into account. Thus, in addition to the technical skills that have been extended, secretarial professionals are required to have human/behavioural skills that are increasingly important in the roles they perform.

Almeida, Borini & Souza (2018) also argue that secretarial professionals are required two levels of skills: technical and behavioural. While technical skills are acquired in specific training, behavioural skills are required of secretarial professionals who act as advisers to executives involved in international strategies.

Paes *et al.* (2019), on the other hand, distinguish three types of organizational skills (raised at the Federal University of Pará): administrative skills; personal skills; management skills.

Table 1 shows the technical and behavioural competencies that the various authors identified as essential to exercise the role of secretarial professional.

With regard to technical skills, Santos (2012b) argues that the mastery of foreign languages represents a great competitive advantage for executive secretaries who work in organizations that operate in the globalized business world. In fact, globalization and increasing technological development mean that, in addition to having to adapt the different work tools, such as information and communication technologies, they also have to give greater importance to the knowledge of foreign languages.

Also, Casanova & Miranda (2015) consider that knowledge of foreign languages and computer and communication skills are essential for secretarial professionals. They also reveal that companies increasingly value innovative skills in the profession, namely protocol and multicultural communication, and it is essential that professionals master several foreign languages and know the rules of business protocol.

Regarding Information and Communication Technologies (ICT), Santos & Ferreira (2014) understand that these have revolutionized the way professionals relate to the job market. The authors consider that new technologies allow the secretarial professional to perform his/her duties with greater efficiency and productivity, in addition to allowing him to relate and interact in a way, sometimes immediately, with the other side of the world, contributing in a strategic way for organizational sustainability. It is then considered that the mastery of new technologies is extremely important for the exercise of the tasks inherent to the secretarial professional as they facilitate the ability to communicate and exchange

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information, allowing to streamline administrative procedures, to make a careful management of documents on file or make information available. It is, therefore, important that secretarial professionals have technical skills in the area of information and communication technologies, in order to take advantage of all its associated advantages.

Table 1. Definition of technical skills and behavioural skills identified by the different authors

Technical skills	Behavioural skills	Authors
<ul style="list-style-type: none"> - knowledge of administrative routines and rules of the institution - domain of the language - elaboration of clear and concise documents with agility - use of resources and software available to manage data and information - ability to plan organizational activities 	<ul style="list-style-type: none"> - responsibility - adaptability - professional ethics and discretion - ability to communicate with different hierarchical levels - good interpersonal relationship - emotional balance in conflict situations and the ability to work under pressure - delegation of activities - time management - logical reasoning - common sense - autonomy to make decisions 	Leal <i>et al.</i> (2018)
<ul style="list-style-type: none"> - ICT domain - proficiency in the mother tongue and foreign languages - good communication skills - ability to perform administrative and financial tasks and routines - knowledge in people management - knowledge of planning and logistics - among others 	<ul style="list-style-type: none"> - organizational capacity - dynamism - creativity - responsibility - proactivity - discretion - ability to work under pressure and consequent emotional intelligence - interpersonal skills 	Müller <i>et al.</i> (2015)
<ul style="list-style-type: none"> - articulation ability - overview of organizations - use of logical reasoning - critical and analytical - mastery of expression and communication resources - information management - management and administrative advice - effective use of secretarial techniques - among others 	<ul style="list-style-type: none"> - customer relationship - teamwork - time management - negotiation - creativity / innovation 	Almeida, Borini & Souza (2018)
<ul style="list-style-type: none"> - document analysis - process flows - archive documents - meeting advice - updating information and data - material and patrimonial resources - processing documents and processes 	<ul style="list-style-type: none"> - discipline - capacity for initiative - innovation - flexibility - analysis and synthesis - interpersonal relationship - teamwork - service to internal and external public - internal communication - responsibility - self-management 	Paes <i>et al.</i> (2019)

Source: own elaboration.

Camargo (2018) argues that the understanding of financial variables, including skills in the area of accounting and management, is central to secretarial professionals, particularly in small organizations, among these professionals. Their study showed that these professionals recognize the importance of these

skills to perform their work in the best way and identified some financial skills as being very important for their professional routine.

Regarding behavioural skills, Cojocaru & Mesquita (2015) reveal that rigor, attention to detail self-motivation, team-work and organizational skills are essential characteristics for a good secretarial professional. As new skills that are increasingly in demand arise resilience (the ability to use their skills and strengths to solve problems and face challenges) and emotional intelligence (understanding and managing emotions in order to create harmonious relationships with others). For these authors, currently, emotional competencies are doubly more important than technical or intellectual capacities (Bichis, 2013 cited in Cojocaru & Mesquita, 2015).

Pereira (2015) also highlights the central importance of behavioural competence as an intermediary in interpersonal relationships within the organization, and between the organization and the outside. According to the author, this professional is directly related to the internal and external public and his/her practice favours group work and, consequently, productivity. His study shows that good interpersonal relationships promote interaction and cooperation, which is manifested in the favourable development of activities inherent to the professional secretarial.

The study by Costa & Durante (2015) attributes special relevance to the interpersonal and communicative skills of secretarial professionals, in the sense that they allow to assertively mediate the relations of the organization's employees and mitigate the negative effects of labour conflicts.

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With the pandemic scenario of COVID19 and, due to the social isolation recommended by the World Health Organization (WHO), organizations were forced to adapt their ways of working to the new health reality.

These changes in the world of work have had a direct impact on numerous professions, both in the ways of working (and in the daily lives of workers) and in the new characteristics of organizations, and even in the development of new business models.

The secretarial professional was no exception, and this new reality has also affected the way he exercises his/her profession.

With the benefit of reducing expenses and maximizing operating results, teleworking has become a widely used option. However, there is resistance to the implementation of telework due to some challenges, such as the adversities that the technological infrastructure can suffer, difficulty in adapting, loss of emotional bond with the organization, communication difficulties, uncertainty about the evaluation and lack of recognition of the work done outside the workplace (Castro, Oliveira, Morais & Gai, 2020).

Thus, remote work, or teleworking, which was already used by some organizations in the area of secretarial and advisory services, became a recurring professional practice in this period, as it is an alternative for workers.

According to Maia, Müller & Bernardo (2020), remote work is a modality that makes it possible to carry out work activities in other spaces than the organizations in which workers work.

Although this form of work has existed since the late 1950s, only with the expansion of ICT in the 1990s, the possibility of multiple types of teleworking began to exist.

The definition of remote work as telework is not homogeneous in different international languages and cultures, however, the International Labour Organization (ILO) uses the concept of telework to refer

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to remote work and considers different variables: place/workspace; working hours/time; type of contract; work content (Rosenfield & Alves, 2011, cited by Maia *et al.*, 2020).

This type of work, strongly adopted in the pandemic, is configured as a potentiality increasingly present in the post-pandemic context (Antunes, 2020).

Thus, we consider it important to investigate how this modality can affect the work of secretarial professionals.

The positive aspects and characteristics considered negative of the adoption of telework are highlighted in the work of Antunes (2020) and Maia *et al.* (2020). As positive aspects of this form of work, they mention the flexibility of schedules, the freedom and autonomy to organize work, personal time management, the possibility of reconciling social, family and work aspects, saving time and reducing stress associated with travel, increased quality of life and well-being, among others. They also identify some negative aspects of teleworking, such as social isolation, increased workload, own spending on infrastructure, conflicts in the work-family relationship, increased anxiety, among others.

We must therefore look at these aspects and consider the new conditions in which secretarial professionals work. It is important that they develop new skills, such as autonomy and time management, and are able to answer more practical questions such as the organization of the workspace, the delimitation of working and non-working times, and the family and family life itself. professional environment (Maia *et al.*, 2020).

It is also important that organizations take some care and outline strategies for this trend of distance work activities. As examples of aspects that must be implemented in order to create a favourable environment for the development of teleworking activities, we can refer to the development of empathic and responsive policies, the maintenance of continuity of work, the provision of resources and necessary support for the work, the establishment of policies for long-term teleworking, the organization of time and the reduction of the working day (Castro *et al.*, 2020).

Attention to mental health assumes special relevance. It is important to adopt measures to support the well-being of employees, to create psychological reception channels and to have frequent corporate communication, in order to intervene to minimize the negative impacts of the pandemic on workers' mental health (Castro *et al.*, 2020).

Another aspect to be taken into account in teleworking is related to working conditions: it is necessary to check whether workers have the availability of tools and structure of information and communication technologies and whether they are trained to carry out this form of work. In the investigation by Maia *et al.* (2020), 70% of respondents had not received training to work remotely and had to learn autonomously how to use the platforms and software adopted by organizations, showing that the responsibility in the process of adapting to this form of work is often transferred to workers.

Digital environments are configured as mechanisms for interaction and continuity of work at a distance. It is, therefore, essential that organizations invest in accelerating digital transformations, and in ICT infrastructures, planning the workforce, improving digitally, investing in marketing and branding and researching post-pandemic consumer behaviour to join efforts against COVID19 (Castro *et al.*, 2020).

METHODOLOGICAL PROCEDURES

As previously mentioned, the objective of this study is to understand the perception of executive secretarial professionals in private companies about the exercise of their profession, before and during the COVID19 pandemic.

For this purpose, we assumed the following research question and list remain research objectives that are presented below.

Research Question

“What is the impact of the COVID19 pandemic on the secretarial function in organizations, with regard to the importance, tasks and skills of secretarial professionals?”

Research Objectives

1. understand the secretarial professional’s perception of the importance of their role within the organization;
2. list the tasks that the secretarial professional assumes as his/her responsibility;
3. determine which skills the secretarial professional identifies as essential for the exercise of his/her profession;
4. compare the evolution of the function, in terms of importance, tasks and skills of the secretarial professional in the period before and after the emergence of the pandemic.

In order to pursue the proposed investigation, it was decided to carry out an empirical study, of a quantitative character, using a questionnaire survey of secretarial professionals in companies associated with the Business Association of the Leiria Region (NERLEI).

Based on the relevant literature (Leal *et al.*, 2018; Müller *et al.*, 2015; Almeida *et al.*, Borini & Souza, 2018; Paes *et al.*, 2019) and on the data collection instrument used by Sousa *et al.* (2016), it was possible to determine 10 indicators that helped us to portray the perception that these secretarial professionals have of the profession they practice, in the two different moments.

In order to ascertain the importance of the main tasks performed by these professionals, the literature review allowed us to determine 35 task indicators, which were likewise included in the questionnaire, so as to understand which of these tasks lost or gained importance with the advent of the COVID19 pandemic.

In view of the understanding related to changes in the importance of personal skills for the exercise of this profession, it was possible to find in the literature a set of 13 indicators that were applied in this study.

Finally, and in order to improve understanding of the changes in the importance of technical skills for the exercise of the secretarial profession, a set of 13 indicators with an echo in the literature was applied to the questionnaire.

The surveyed population are the individuals that assumes secretarial functions in companies associated with Business Association of the Leiria Region (NERLEI). The response rate is 13% of the universe of NERLEI companies from the areas of commerce, industry and services.

The questionnaire survey is structured as follows, including the indicators below:

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1. In the first part, the information was requested regarding the respondent and the company characteristics.
2. In the second part, respondents were asked for their opinion on a set of issues related to the perception of the profession. Using a Likert scale, respondents were asked to indicate to what extent they agreed with the statements presented indicating their response before and after the emergence of the COVID19 pandemic. The statements presented were as follows:
 - a. “The functions performed by the secretary / advisor contribute to the decisions made in the organization.”;
 - b. “The role of the secretariat is recognized in the organizational environment”;
 - c. “The secretary / advisor needs to have an overview of the organization in order to perform his/her duties efficiently”;
 - d. “The secretary / advisor is the” right hand “of the organization’s leader”;
 - e. “I recognize the importance of the functions of the secretariat for the performance of the organization”;
 - f. “The personal characteristics of the secretary / advisor influence the efficient performance of his/her duties”;
 - g. “The secretary / advisor is the liaison “par excellence” between management and the organizational world”;
 - h. “Communication between the hierarchy and subordinates and between the organization and the outside is the responsibility of the secretariat”;
 - i. “With the advent of the pandemic caused by COVID19 in Portugal, the mastery of computer tools has become a central competence in the daily exercise of the profession”;
 - j. “The impact of the work of secretary / advisor took on greater importance in the organization with the advent of the pandemic caused by COVID19 in Portugal”.

c) In the third part, respondents were asked to indicate the degree of importance they attributed to the tasks inherent to the secretarial professional, before and after the emergence of the pandemic COVID19. The tasks that were assumed to be inherent in the exercise of the profession are:

1. Face-to-face contact with the hierarchy.
2. Online contact (digital platforms, mail, etc.) with the hierarchy.
3. On-site assistance to other employees, students and teachers.
4. Online service (digital platforms, mail, etc.) to other employees, students and teachers.
5. Management of generic, non-electronic mail (written correspondence, advertising, newspapers, etc.).
6. E-mail management.
7. Writing of written communications.
8. Organization of face-to-face meetings.
9. Organization of online meetings.
10. Travel organization.
11. Organization of face-to-face events (conferences, workshops, lectures, open classes, etc.).
12. Organization of online events (conferences, workshops, lectures, open classes, etc.).
13. Translations.
14. Management of institutional website.

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15. Management of the hierarchical superior's agenda.
16. Preparation of documents for accounting.
17. Telephone service.
18. Performance in financial and commercial operations, purchases, payments, etc.
19. Proceed with internal communication / disseminate information.
20. Communicating personally with people from other organizations.
21. Communicate online (digital platforms, mail, etc.) with people from other organizations.
22. Provide administrative support.
23. Leave the work environment in order.
24. Make presentations in person.
25. Make presentations online (digital platforms).
26. Do research.
27. Filter information.
28. Manage the archive.
29. Manage human resources.
30. Manage materials for work.
31. Interact personally with people from different departments or schools.
32. Interact online (digital platforms) with people from different departments or schools.
33. Represent the organization at external events.
34. Assist in decision making.
35. Acting in solving problems.

d) In the fourth part, respondents should answer about the importance they attached to the personal and technical skills necessary to carry out their activity, before and after the emergence of the pandemic COVID19.

The personal skills to choose were: description; punctuality; courtesy/diplomacy; common sense; determination; proactivity; autonomy; organization; creativity; cared appearance; rigor; loyalty.

The technical skills considered include: command of the Portuguese language; mastery of a foreign language; mastery of two foreign languages; domain of computer applications; mastery of digital platforms; protocol; archiving techniques; general Culture; behavioural skills; accounting/finance; right; specific knowledge in secretarial and advisory; leadership and initiative.

Respondents were contacted by email, in order to complete the survey by questionnaire (available in Google Docs), having been explained the reasons for the survey and guaranteed the anonymity of the participants and the confidentiality of the responses.

The questionnaire was applied in October 2020.

The characteristics of the sample are as follows:

1. The majority of these respondents develop their activity in the municipality of Leiria, and are also present in this study respondents from companies from other municipalities in the district of Leiria, such as Alcobaça, Marinha Grande, Porto de Mós, Batalha and Pombal.
2. About half of the companies that make up the sample operate in the Industry sector (47%), with the rest operating in the trade sector (34%) and in the services sector (19%). The average number of years in which these companies are in operation is 18 years.

3. Respondents (secretarial professionals) are mostly female (84%), as opposed to male, only represented by 16% of respondents.

ANALYSIS OF RESULTS

The analysis of the results obtained from the application of the questionnaires, contemplates the perception of secretarial professionals about their performance in the organization in different periods, before the emergence of the pandemic COVID19 and after the emergence of this pandemic. The results show a set of changes in the perception that secretarial professionals have of the profession they exercise, as well as the importance attributed to the tasks they perform, and the personal characteristics and techniques necessary for their performance.

The results obtained through the statistical treatment of the data collected through the questionnaire are presented below, starting with the characterization of the sample, perception of the evolution of the profession, main tasks, personal skills and technical skills. Each of these points will be discussed in separate points and at each of these moments the indicators under study will be presented, the corresponding degree of agreement understood by the respondents for the two moments under analysis (before and after COVID19). From the global analysis of these results, it will be possible to determine the main conclusions and recommendations for future studies.

Perception of the Evolution of the Profession

Bearing in mind that the first set of indicators intends to determine the degree of agreement regarding the perception that secretarial professionals have of the exercise of their profession, it is important to mention that all 10 indicators are positively identified on the scale of agreement, before and after the appearance of COVID19, since for both moments of assessment, all indicators have values greater than 3 on the 5-point scale of the Likert scale.

From the analysis of Table 2, it is possible to notice that there is a set of indicators that, regardless of the moment under analysis (before or after the appearance of COVID19), bring together the consensus on the very high importance of the profession. In this regard, it is important to mention the indicators that reveal the perception of the profession “The secretary/advisor needs to have a global view of the organization in order to perform his/her functions efficiently”, “I recognize the importance of the functions of the secretariat for the performance of the organization”, “The personal characteristics of the secretary/advisor influence the efficient performance of his/her functions” and “The role of the secretariat is recognized in the organizational environment”. All of these 4 indicators are classified with a very high degree of agreement, which indicates: (1) a general recognition by the secretarial professionals of the great importance and impact that their professional activity assumes in the organization they integrate; (2) that these same organizations recognize these professionals as important for the company in the development of its activity; (3) that in order for their profession to be effectively exercised, there is a need to provide them with global knowledge about the organization, the external and internal environment, in particular, the strengths, weaknesses, threats and opportunities of the contextual universe where the member organizations develop their activity; (4) that these professionals are aware that their personal characteristics have a decisive influence on their performance in favour of the organization they represent.

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Table 2. Perception of the profession before and after the emergence of the Covid19 pandemic

Indicators: perception of the profession	Before COVID19	After COVID19	Variation before/ after COVID19
1 - The functions performed by the secretary / advisor contribute to the decisions made in the organization.	3.808	4.144	0.336
2 - The role of the secretariat is recognized in the organizational environment.	4.016	4.408	0.392
3 - The secretary / advisor needs to have a global view of the organization in order to perform his/her duties efficiently.	4.480	4.616	0.136
4 - The secretary / advisor is the “right hand” of the organization’s leader.	3.760	4.144	0.384
5 - I recognize the importance of the functions of the secretariat for the performance of the organization.	4.424	4.584	0.160
6 - The personal characteristics of the secretary / advisor influence the efficient performance of his/her duties.	4.272	4.296	0.024
7 - The secretary / advisor is the liaison “par excellence” between management and the organizational world.	3.912	4.056	0.144
8 - Communication between the hierarchy and subordinates and between the organization and the outside is the responsibility of the secretariat.	3.408	3.416	0.008
9 - With the advent of the pandemic caused by COVID19 in Portugal, the domain of computer tools has become a central competence in the daily exercise of the profession.	4.256	4.728	0.472
10 - The impact of the work of secretary / advisor assumed greater importance in the organization with the advent of the pandemic caused by COVID19 in Portugal.	3.688	4.016	0.328

Among these 10 indicators, there is another one that reports the analysis of the importance of the domain of computer tools with the appearance of the pandemic COVID19.

In this particular case, these specific technical competences are approached from a specific moment in time, whose domain, with the changes introduced in the world of work and companies, such as teleworking, exemption from schedules, among others, is credible that they have assumed greater importance. Thus, the indicator “With the advent of the pandemic caused by COVID19 in Portugal, the mastery of computer tools has become a central competence in the daily exercise of the profession” indicates a very high degree of agreement among respondents with the statement. The interpretation of this result leads us to believe that not only does the generalized idea exist in the community that these competencies have come to acquire centrality in the world of work, but they are consciously present among the secretarial professionals as fundamental for the best exercise of their profession.

Following are a set of other indicators that, despite having been classified as moderately significant before COVID19, with the advent of this pandemic, clearly rose in the degree of agreement regarding the perception that secretarial professionals have of their profession. The values with which the respondents evaluate the indicators “The functions performed by the secretary/advisor contribute to the decisions made in the organization”, “The secretary/advisor is the “right hand” of the organization’s leader”, “The secretary/advisor is the liaison “par excellence” between management and the organizational world” and “The secretary / advisor is the liaison ”par excellence” between management and the organizational world “indicate that the emergence of the pandemic has intensified the perception that: (1) there was an increase in the importance of the secretarial professional, in the sense that they are increasingly seen as

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the main aid to management, with regard to decision making and the connection of the company and the organizational world in which it is inserted. Such considerations are in line with the indicators previously analysed and which point towards the growing importance of global knowledge of the organizational world in which the company operates, on the part of these professionals and the reinforcement of the importance of their personal and technical skills.

Still within the scope of the relative analysis of the indicators addressed to understand the respondents' perception of their profession, the indicator "Communication between the hierarchy and subordinates and between the organization and the outside is the responsibility of the secretariat", which points us to a sense of moderate importance, comparatively less compared to the other indicators, and which reveals that it is the understanding of these professionals about their communication with the different hierarchical levels, or even with the outside world, it is something inherent to the effective performance of their professions, but which is not as relevant as what was addressed in the previous indicators.

Now focusing the analysis exclusively on the comparison of the results related to the indicators on the perception of the profession, before the pandemic COVID19 and after its emergence, the first result that was mentioned already is the appearance of the pandemic provided the intensification of the agreement of the respondents in all indicators. This corresponds to saying that it is consensual among the respondents the opinion that with the emergence of the pandemic COVID19 there were significant changes in the way the profession is understood in the organizational world, as its relevance in the organization now gains a new framework, either by increasing the importance with which the functions they exercise are now seen by the hierarchy, either by reinforcing the skills that are required for the exercise of the profession. Specifically, we highlight the results obtained regarding the degree of agreement of the respondents in relation to the following indicators: "With the advent of the pandemic caused by COVID19 in Portugal, the domain of computer tools has become a central competence in the daily exercise of the profession", "The role of the secretariat is recognized in the organizational environment", "The secretary/advisor is the "right hand" of the leader of the organization" and "The functions performed by the secretary/advisor contribute to the decisions made in the organization". Among the 10 indicators presented, these 4 are the ones that most visibly show changes in the perception of the profession by professionals, since these are the indicators that present the greatest variation between the level of analysis before COVID19 and after the emergence of the COVID19, respectively, based on the Likert scale with the interval [1, 5], 0.472 ("With the advent of the pandemic caused by COVID19 in Portugal, the domain of computer tools has become a central competence in the daily exercise of the profession"), 0.392 ("The function of the secretariat is recognized in the organizational environment"), 0.384 ("The secretary/advisor is the "right hand" of the organization's leader") and 0.336 ("The functions performed by the secretary/advisor contribute for decisions made in the organization").

In line with the above, it was the indicator "Communication between the hierarchy and subordinates and between the organization and the outside is the responsibility of the secretariat", which had already been mentioned as the one with the most moderate level of agreement by respondents, the one that showed less variation between these two analysed periods (0.008).

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Table 3. Importance of tasks before and after the appearance of COVID19

Indicators: Importance of tasks	Before COVID19	After COVID19	Variation before/ after COVID19
1 - Face-to-face contact with the hierarchy.	4.336	3.688	-0.648
2 - Online contact (digital platforms, mail, etc.) with the hierarchy.	3.696	4.568	0.872
3 - In-person service to other employees, customers or suppliers.	4.376	2.832	-1.544
4 - Online service (digital platforms, mail, etc.) to other employees, customers or suppliers.	3.360	4.496	1.136
5 - Management of generic, non-electronic mail (written correspondence, advertising, newspapers, etc.).	3.896	3.712	-0.184
6 - E-mail management.	4.024	4.712	0.688
7 - Writing of written communications.	3.776	3.968	0.192
8 - Organization of face-to-face meetings.	4.008	2.776	-1.232
9 - Organization of online meetings.	2.912	4.024	1.112
10 - Travel organization.	3.168	2.656	-0.512
11 - Organization of face-to-face events (conferences, workshops, lectures, etc.).	3.512	2.336	-1.176
12 - Organization of online events (conferences, workshops, lectures, etc.).	2.688	3.496	0.808
13 - Translations.	3.064	3.056	-0.008
14 - Management of institutional website.	2.896	3.440	0.544
15 - Management of the hierarchical superior's agenda.	3.408	3.384	-0.024
16 - Preparation of documents for accounting.	4.208	4.272	0.064
17 - Telephone answering.	4.184	4.552	0.368
18 - Performance in financial, commercial, purchasing, payments, etc.	3.936	3.864	-0.072
19 - Proceed with internal communication / disseminate information.	3.984	3.968	-0.016
20 - Communicate personally with people from other organizations.	3.952	3.024	-0.928
21 - Communicate online (digital platforms, mail, etc.) with people from other organizations.	3.536	4.328	0.792
22 - Provide administrative support.	4.256	4.416	0.160
23 - Leave the work environment in order.	4.192	4.040	-0.152
24 - Make presentations in person.	3.256	2.328	-0.928
25 - Make presentations online (digital platforms).	2.648	3.536	0.888
26 - Do research.	3.344	3.904	0.560
27 - Filter information.	3.720	3.936	0.216
28 - Manage file.	3.720	3.664	-0.056
29 - Manage human resources.	3.816	4.264	0.448
30 - Manage materials for work.	4.080	4.264	0.184
31 - Interact personally with people from different departments or organizations.	4.064	3.016	-1.048
32 - Interact online (digital platforms) with people from different departments or organizations.	3.184	4.296	1.112
33 - Represent the organization at external events.	3.408	2.520	-0.888
34 - Assist in decision making.	3.776	4.072	0.296
35 - Acting in problem solving	3.984	4.176	0.192

Importance of Tasks

The second set of indicators aims to ascertain the degree of agreement of the respondents regarding the perception that secretarial professionals have about the main tasks they perform in the context of their profession. Once again, two distinct moments for analysing the responses were considered, before and after the appearance of COVID19. Contrary to what was seen previously in the indicators related to the perception of the profession, not all 35 tasks advanced by the study as indicators of analysis were scored with the agreement of respondents about them. It appears that the tasks indicated have seen their importance increase, with the advent of the COVID19 pandemic.

From the analysis of Table 3, it is possible to see that most of the indicators under study to ascertain the level of agreement of the respondents' importance on various tasks for the good exercise of the secretarial profession, deserves a positive response at both times under study (before and after the emergence of COVID19). This confirms the perspective Leal *et al.* (2018), Müller *et al.* (2015) and Almeida *et al.* (2018), whose investigations reveal importance to have technical and behavioural skills. In total, 25 of the 35 indicators, even if they lose or gain centrality in the exercise of this profession depending on the conjuncture, never fail to have a degree of positive agreement, that is, regardless of the scenario before or during the pandemic, these are always tasks of relative importance for these professionals.

In this regard, it is important to mention that the indicators that, after the appearance of the pandemic, pass into the negative field of agreement on the part of the respondents are the following: "Face-to-face service to other employees, students and teachers", "Organization of face-to-face meetings", "Travel organization", "Organization of face-to-face events (conferences, workshops, lectures, open classes, etc.)" and "Represent the organization at external events", emphasising the importance of the communication and organization skills (Cojocarú & Mesquita, 2015; Costa & Durante, 2015). In fact, these are tasks that imply the physical presence of the worker in the organization, and that have lost importance in the context of the pandemic, following the new working methods adopted by the companies, strongly encouraged by the same health and government authorities, namely within the scope of teleworking.

The indicators, which, on the contrary, no longer have negative agreement and are now, in the pandemic context, obtaining the agreement of respondents as to their importance, are as follows: "Organization of online meetings", "Organization of online events (conferences, workshops, lectures, open classes, etc.)", "Management of institutional web page" and "Making presentations online (digital platforms)". The results thus reveal that before the appearance of the pandemic COVID19, these tasks were not considered important and that the changes verified in the method, management and organization of the world of work, and already described in this study, gave them a new centrality.

When we analyse the results of the indicators in absolute terms, by comparing the two periods under study, we find results that reinforce the trend verified in relation to the importance attributed to each task, reflecting the changes in the world of work that arose with the pandemic. Thus, tasks whose importance loses relevance are those that imply the physical presence of the worker in the organization, such as: "Face-to-face service to other employees, customers or suppliers", "Organization of face-to-face meetings", "Organization of face-to-face events (conferences, workshops, lectures, etc.)", "Communicating personally with people from other organizations" and "Interacting personally with people from different departments or organizations". As for the indicators that rise most are those that imply activities carried out at a distance, such as: "Online service (digital platforms, mail, etc.) to other employees, customers or suppliers", "Organization of online meetings line.", "Organization of online events (conferences, workshops, lectures, etc.)", "Online contact (digital platforms, mail, etc.) with the hierarchy", "Making

presentations online (platforms digital)” and “Interact online (digital platforms) with people from different departments or organizations”.

Importance of Personal Skills

The third set of indicators aims to ascertain the degree of agreement of the respondents regarding the perception that secretarial professionals have about the personal skills essential to the performance of their profession. In line with the general orientation of the study, respondents comment on their perception of the item under analysis, for two different periods, before and after the appearance of COVID19.

From a general analysis of the results obtained, we conclude that all 13 indicators are positively identified in the Likert scale adopted, before and after the appearance of COVID19, which confirms the findings obtained by Bozada-Meza & Rodríguez (2017) and Stroman *et al.*, 2014. Thus, all indicators related to personal competencies, for both periods under analysis, present values greater than 3 on a scale [1.5].

It appears that the overall level of agreement is quite high, with almost all responses pointing to a degree of agreement among respondents above 4 (with the exception of the “creativity” indicator, before the pandemic COVID19), which reveals that, in general, respondents consider that personal skills are of high importance for the good performance of their professional activity. Since the positive assessment of the indicators related to personal skills by the respondents is reinforced with the emergence of the pandemic (11 out of 13 indicators are revised upwards), we can conclude that, after this event, personal skills assume even more relevance for the good performance of the functions.

Table 4. Importance of personal skills before and after the appearance of COVID19

Indicators: personal skills	Before COVID19	After COVID19	Variation before/ after COVID19
1 - Description	4.472	4.600	0.128
2 - Punctuality	4.792	4.792	0.000
3 - Courtesy / diplomacy	4.608	4.760	0.152
4 - Common sense	4.608	4.712	0.104
5 - Determination	4.472	4.608	0.136
6 - Proactivity	4.432	4.752	0.320
7 - Autonomy	4.696	4.808	0.112
8 - Organization	4.496	4.944	0.448
9 - Creativity	3.896	4.176	0.280
10 - Cared appearance	4.496	4.336	-0.160
11 - Rigor	4.776	4.808	0.032
12 - Loyalty	4.712	4.920	0.208
13 - Communicative (oral / written)	4.616	4.872	0.256

Thus, looking at Table 4, we find that, in general, there are no major fluctuations in the assessment that respondents make regarding these indicators. With the advent of the COVID19 pandemic, only one personal competence is understood to have lost importance: “Cared appearance”, revealing the transfer

of function to the teleworking regime. Another competence that maintains the same levels of agreement on the part of respondents is “Punctuality”. The remaining competencies are given greater emphasis in a pandemic environment, with a more significant increase in the agreement on the importance attributed by respondents to the following indicators: “Organization”, “Loyalty”, “Communicative (oral / written)”, “Courtesy / diplomacy “, ” Determination” and “Description”.

Technical Skills

Finally, the fourth set of indicators aims to ascertain the perception that secretarial professionals have about the technical skills essential to the good performance of their profession, comparing the periods “before the appearance of COVID19” and “after the appearance of COVID19”.

A global analysis of the results obtained highlights that all respondents identify the importance of mastering technical skills inherent in the secretarial and advisory function, as, for both moments under analysis, all indicators have values greater than 3, within the scope of a Likert scale [1-5].

It appears that the overall level of agreement is quite high, although slightly below the values achieved with the degrees of agreement reached by personal skills. Most responses point to a level of agreement above 4 (with the exception of the indicators “Domain of two foreign languages”, “Accounting / finance” and “Law”, before and after the pandemic COVID19, and the indicator “Domain of digital platforms”, before the pandemic COVID19).

It is possible to realize, however, that, despite the fact that respondents attach importance to all technical skills, there are indicators that are more evident than others. It is possible to perceive, for example, that the mastery of the Portuguese and English languages, the knowledge of computer applications, as well as the archival techniques and behavioural competencies are rated much higher than the other competencies, showing the greatest importance relative to them. These results corroborate those obtained by Santos & Ferreira (2014), Casanova & Miranda (2015) and Camargo (2018).

With regard to the comparison of these skills in the two periods under analysis, we can see that, in general, there are no major fluctuations in the perception of respondents regarding the importance of these skills. In this regard, it is important to highlight two indicators that gain greater relevance with the pandemic COVID19: “Domain of digital platforms” and “Domain of computer applications”. In both cases, we are once again faced with skills that require the adaptation of these professionals to technological means and digital tools, challenges that have gained visibility with the adoption of forms of distance work strengthened by the impact of the pandemic COVID19 in the development of the professional activity.

Table 5. Importance of technical skills before and after the emergence of COVID19

Indicators: technical skills	Before COVID19	After COVID19	Variation before/ after COVID19
Portuguese language	4.632	4.920	0.288
Domain 1 foreign language	4.032	4.112	0.080
Domain two foreign languages	3.064	3.264	0.200
Domain computer applications	4.120	4.688	0.568
Domain digital platforms	3.936	4.536	0.600
Protocol	4.144	4.280	0.136
Archive techniques	4.368	4.280	-0.088
General Culture	4.040	4.312	0.272
Behavioral skills	4.440	4.584	0.144
Accounting / Finance	3.864	3.960	0.096
Law	3.376	3.640	0.264
Specific knowledge in secretarial and advisory	4.144	4.416	0.272
Leadership and initiative	4.088	4.296	0.208

Conversely, the “Archival Techniques” competence can only be pointed out as the only technical competence that loses importance in this new health context, a fact that may also be associated with the lesser presence of the employee in the company’s physical facilities. This analysis may also be associated with the fact that the respondents consider in their answers only the physical archive, neglecting the digital archive.

CONCLUSIONS AND RECOMMENDATIONS

The appearance of the pandemic COVID19 and its transfer to most countries in the world brought profound changes in life in society, with an impact on the daily lives of citizens, in all sectors of society. At the economic level, measures such as the compulsory isolation of families in their homes and a ban on movement between countries, have had devastating effects in most sectors of economic activity. Companies, for their part, have been forced to adopt new working methods, to innovate in the processes and products and services they offer, to develop new business models.

The impacts of this adjustment were transversal and the adoption of new forms of work has been recognized as capital gains that may last beyond this pandemic period. If this is true for most professions that can be carried out, at least partially, in teleworking, with flexible hours, and even allowing for a better balance between professional and family life, the profession of the secretariat and advisory assume, in this context, special relevance. Given the nature of the tasks he develops, this professional will have a high capacity to adapt the tasks and activities that he/she has to perform to a non-traditional physical context, outside the company’s normal space.

However, the pandemic has also reinforced the need to “look” at the secretarial professional as a collaborator who takes on extremely important tasks in the company, with an impact on the internal

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organization and on the way the company deals and communicates with the outside, which may also imply the assumption of new responsibilities, tasks and competencies.

It is in this context that the present investigation intends to understand the impact of the pandemic COVID19 in the secretarial function in organizations, with regard to the importance, tasks and competencies of the secretarial professionals.

The results obtained show the perception of secretarial professionals regarding the importance of their role within the organization. They also allowed to list the tasks that the secretarial professional assumes as his/her responsibility and to determine the personal and professional competencies that the secretarial professional identifies as determinants for the exercise of his/her profession. It was also possible to compare the evolution of the function, in terms of importance, tasks and skills of the secretarial professional, in the period before and after the emergence of the pandemic.

With regard to the perception of the profession and its evolution, we conclude that there is widespread recognition on the part of secretarial professionals of the great importance and impact that their professional activity has on the organization that they integrate.

We also determine that these professionals consider that for the exercise of their functions it is essential to have a vast and deep global knowledge of the organization. In this sense, this professional must understand and know how to act in the organization internally (namely, knowing the respective strengths and weaknesses), but also to know the external environment of the company (detecting the threats it faces and being aware of the opportunities that arise from the contextual universe that organizations integrate and interact with). There is also a clear understanding of these professionals about the importance of having various personal and technical skills that decisively influence their performance in order to fulfil their role in the organization they integrate.

There is a consensus that, with the emergence of the pandemic COVID19, there have been significant changes in the new conditions and requirements inherent to the exercise of the profession. In this sense, the profile, competencies and responsibilities take on a new framework, either by increasing the importance with which the functions they exercise are now seen by the hierarchy and by the entire organization, or by reinforcing the responsibility and competencies that are required of them. Therefore, there was an increase in the importance of the secretarial professional, in the sense that he/she is increasingly seen as the main aid to management, in relation to the decision making and to the connection between the company and the organizational world in which it operates.

With regard to the tasks developed by the secretarial professional, and, following the health limitations emanated by the competent authorities in the context of the pandemic COVID19 and the new professional practices adopted by companies and strongly encouraged by the same health or government authorities, it is possible to conclude that less importance is now attached to tasks that involve physical presence at work. In the opposite direction, tasks associated with remote development, outside the company's premises, gain greater prominence in this new context. In this last type of tasks, the attendance, the organization of events and online meetings, the online contact through digital platforms with various internal and external entities are included, among which the hierarchy, the stakeholders and collaborators of other departments or organizations.

Professionals consider that skills such as description, punctuality, courtesy and diplomacy, common sense, determination, proactivity, autonomy, organization, rigor, and loyalty are important for the performance of the functions assigned to them. They consider that these attributes are absolutely fundamental for the good performance of their professional activity. The notion of the importance of personal skills is even more relevant in the context of the COVID19 pandemic. Which is to say that, after the emergence

of this event that plagues the world economy, the good exercise of the secretarial and advisory profession now depends, even more, on these personal skills, reinforcing the conclusions of several studies that show the importance of this type of competence, among which Bozada-Meza & Rodríguez (2017) and Stroman, Wilson & Wauson (2014).

On the other hand, the mastery of technical skills is also considered essential for carrying out activities inherent to the secretarial and advisory professional. Even so, we found evidence that reveals that the mastery of Portuguese and foreign languages, the mastery of computer applications, archival techniques, behavioural skills and the mastery of digital platforms gain a new centrality with the current conjuncture. We are again faced with skills that require the adaptation of these professionals to technological means and digital tools. These results corroborate the relevant literature where the importance of the domain of technical skills is evidenced, such as the domain of foreign languages recognized by Santos (2012b) and by Casanova & Miranda (2015) and the domain of computer skills demonstrated in the work of Antunes (2020) and Maia *et al.* (2020).

As in any other quantitative study, the data are treated globally, without giving the opinion of the respondents in-depth. In this way, it would be interesting, in future studies, to triangulate the data, allowing the integration of interviews to secretarial professionals, in order to understand in depth the challenges inherent to the exercise of the profession in times of pandemic. Since the research favors the administrative point of view, it would be interesting include in these interviews psychological indicators.

We are experiencing an epidemiological crisis that affects all sectors of the economy, some in a very profound way, implying the adoption of new customer relationships, the emergence of new processes and products and the reinvention of ways of working. In this sense, it is extremely important that companies are proactive in order to minimize the effects of the crisis and take advantage of the opportunities that may arise from it. The reinvention of processes and new forms of work must take place at different hierarchical levels, and in the relationship between them, from management to employees who perform operational functions. The study of these impacts in terms of human resources and, more specifically, in the activities and responsibilities assigned to secretarial professionals, will certainly contribute to the study of a changing profession, increasingly based on flexible operating models with regard to schedules, activities, profile and working methods (especially teleworking).

Thus, the implementation of new forms of work in organizations, their effects on the efficiency and productivity of employees, the emergence of new business models, the identification of innovation in processes, products and services, as well as the analysis of the impacts on the reconciliation of different spheres of the collaborators' lives (in particular, reconciling family life and work) are suggestions for future research clues on the impact of the COVID19 pandemic on society and the economy.

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Chapter 22

Economics and COVID-19: A Bibliometric Analysis of the First Months of Publications

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ABSTRACT

This work discusses a bibliometric analysis of the papers published during 2020 about COVID-19 and three relevant economic keywords: GDP, unemployment, and innovation. Considering different outcomes, a significant diversity of journals without the focus on economic issues publishing articles discussing the economic impacts of the COVID-19 pandemic was observed. The authors have also suggested some correlated dimensions between the number of articles authored by researchers affiliated to different universities of diverse countries and the severity of the pandemic indicators observed for these spaces.

INTRODUCTION

The pandemic identified as Covid-19 brought a set of exceptional challenges for the scientific community (Squazzoni et al., 2020). If, on the one hand, the urgency created by the numbers of deaths and the speed of the disease's spread put pressure on the search for a vaccine that could be tested as effective on a global scale, on the other hand, the new rhythms of social interaction and changes in academic work structures have provided additional opportunities for academic reflection (Rosales-Mendoza et al., 2020), also focused on the need for adequate public policies (Lu et al., 2021), definitions of social confinement/lockdown and reduction of economic activity with minimal subsequent impact (Beyer et al., 2021; Lovric et al., 2021; Straka et al., 2021; Vukic et al., 2021).

Thus, based on the digital resources on a global scale that exist today, we have been able to witness a unique proliferation of academic works focused on the pandemic and its implications (Anazco et al., 2021). Multidisciplinary and interdisciplinary academic works have emerged alongside specific works

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in the most-pressured areas. Thus, alongside multiple works in the areas of Health Sciences, works in the areas of Social Sciences, Engineering or even Linguistic Sciences have appeared in unprecedented frequency (Ruiz-Real et al., 2020).

In view of this proliferation, we believe it currently has clear needs for reflection. For this reflection, the bibliometric analysis may bring interesting contributions, namely for the scientific community (El Mohadab et al., 2020). In addition to the natural wealth of publications centered on Covid-19, which are numerous, their diversity, the heterogeneity of results, or the associated public implications requires such arrangement in appropriate methodological resources.

The bibliometric analysis proposed here – and given the focus of this book – focuses on three sub-themes associated with the pandemic. Thus, we will focus on the identified publications related to Covid-19 and Unemployment, Covid-19 and National Production (GDP), and Covid-19 and Entrepreneurship. We could have chosen any other sub-themes of Economics and Management but reasons of current relevance, reflected in the significant frequency of the number of publications identified in these sub-themes, prevailed.

Thus, the structure of this work is as follows. In section 2, we carry out a review of the literature on the subject and elucidate the steps of our methodological process for bibliometric discussion. In section 3, we complete the steps and discuss the achieved results, namely in the following analysis structures: distribution of the identified documents, Number of Records for Research Areas, Number of Records for Languages, Number of Records for Countries, and Number of Records for the Sources. Section 4 concludes.

Literature Review

The impacts of the Covid-19 pandemic are, in fact, severely negative for the diverse economic sectors and activities (Gomez-Rios et al., 2021), namely for the most vulnerable ones (Handoko, 2021), such as the micro business (Alvarez Vasquez et al., 2020). In consequence, with the evolution of the pandemic the topics related with the socioeconomic dimensions gained relevance for the researchers (Lorusso et al., 2020).

Nonetheless, the implications from the pandemic are not only on the economic dynamics (Rodrigues et al., 2020). These consequences are multilevel and spread over the several human ways of life and conditions of work (Beregal-Mirabent, 2021). The health systems were, also, put under pressure and its adjusted management was determinant to avoid a catastrophe even bigger (Li et al., 2020). In any case, the pressures put over the several sectors promoted the development of new solutions (Waqas et al., 2020; Teirumnieks et al., 2021). The transportation activities are other sectors where the impacts were tremendous (Tanriverdi et al., 2020).

This context claims for deeper international cooperation among the researchers to achieve a more sustainable development (Chernysh & Roubik, 2020), in an interdisciplinary (Haghani et al., 2020) and multidisciplinary (Klingelhofer et al., 2020) perspective, where the innovation has its importance (Greve et al., 2020), including financial innovation (Li & Xu, 2021). This is particularly important, if it is considered that these new scenarios impose the need of rethinking theories and models in the several levels of the human life (Marczewska & Kostrzewski, 2020). The global crises (financial and pandemic) create contexts that promote the research production in the respective fields (Pattnaik et al., 2020).

The artificial intelligence and other innovative approaches may be interesting techniques supporting the researchers to deal with the new tasks brought by the current frameworks (Ciampi et al., 2021).

A great part of the scientific literature cited in this section considered the bibliometric methodologies in their researches, showing the importance of these analyses as supports for the scientific community (Neves de Oliveira et al., 2021). Some of the developments carried out highlight the relevance of some fields, such as the social sciences (Nasir et al., 2020), among others.

The Importance of a Bibliometric Analysis of Publications Focused on Covid-19 and Economics

The pandemic identified as Covid-19 has revealed some characteristics of scientific research that have not yet been expressed with equivalent meaning.

First, as a result of media coverage, technological and communicational development, the research community has produced reports, working papers, articles and even books on the subject at a significant and unprecedented pace. In May 2020, *The Economist* (2020) observed how scientific research on the coronavirus was being released “in a torrent” (sic). In May 2020, and following *The Economist* (2020), there were around 5,000 articles focused on Covid-19; in November 2020, we have already been able to identify more than 50,000 scientific works on the same topic.

To understand how global scientific research was motivated to analyze the issues surrounding Covid-19, we also looked at what happened to some of the most impressive pandemics, namely “Bird Flu” and “Influenza A.” A search in Web of Science Core Collection shows that in less than two months (between November 17, 2019, the date of the first positive case identified in China, and December 31, 2019), 11 publications had identified the Covid-19 term; comparatively, figures 1 and 2 reveal that it took four years for “Bird Flu” to have 11 publications, and it took seven years for “Influenza A” to reach that number (Web of Science, 2020).

Second, the search for contributions by the academic community to assist in the definition of public policies and in support of an effective vaccine was stimulated by public research support systems through the creation of calls for projects. These incentives by governmental and non-governmental entities, of a scientific nature, created additional opportunities for the dissemination of knowledge.

Third, the period of lockdown – heterogeneous in terms of civic and social restrictions and time span or government renewal – created conditions for different researchers focusing on the Covid-19 issue.

Therefore, it is not surprising that a proliferation of investigations has centered on Covid-19 and, based on this topic, also focused on a universe of associated issues – from the causes of the pandemic (behavioral, environmental, biological and/or sociological causes) to the consequences of the same pandemic (socio-economic, environmental consequences, etc.).

However, despite such a proliferation of investigations (as of November 11, 2020, already 50,255 documents filtered with the expression Covid-19), the scientific community only has a limited number of investigations focused on the bibliometric relationships of these publications about Covid-19 or some sub-thematics (Web of Science, 2020). Among the investigations focused on the bibliometric relationships of these publications about Covid-19, we highlight the works of Chahrour et al. (2020), Cachón-Zagalaz et al. (2020), and Meyerowitz-Katz & Merone (2020).

Figure 1. Distribution by year of the 662 documents found in the WoS (Core Collection) for the topic “bird flu”

Source: Own elaboration with data from WoS (2020)

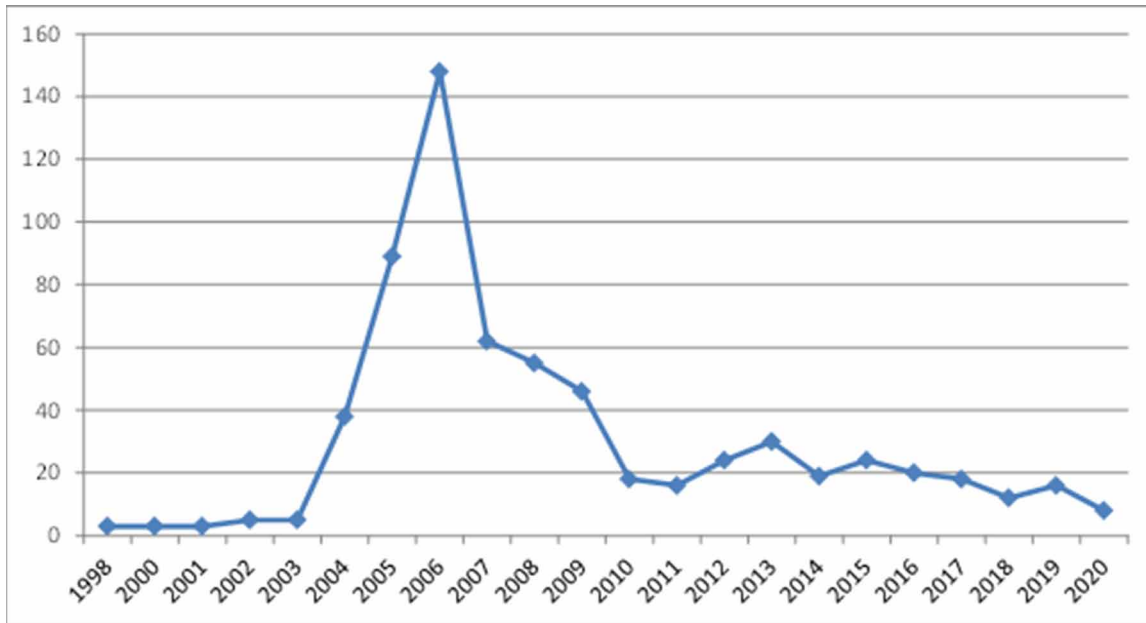
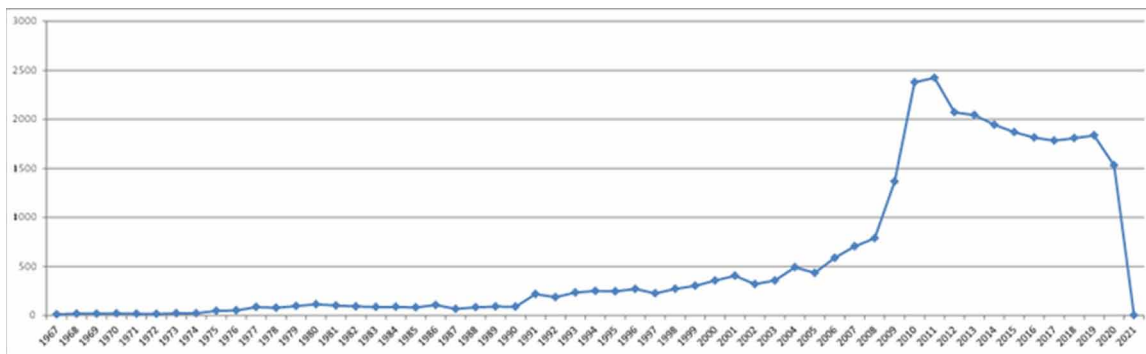


Figure 2. Distribution by year (since 1967) of the 31,327 documents found in the WoS (Core Collection) for the topic “influenza A”

Source: Own elaboration with data from WoS (2020)



The exercise of constructing these bibliometric relationships has proven to be relevant for several academic purposes (Mourao & Martinho, 2020; Martinho & Mourão, 2020). We can understand the urgency the international scientific community has placed on the development of vaccines capable of immunizing the maximum number of individuals around the globe, the design of appropriate medications for the treatment of those infected, and the definition of public policy actions aimed at reducing pandemic impacts on the different dimensions of community life and individual well-being. However,

both the proliferation of thousands of publications created in such a short time and the diversity of sub-themes requires an appropriate organization, even for the purposes of the quality required for academic reflection. Other advantages of bibliometric analyses are extremely pertinent to the pandemic moment in which we are living. In addition to enabling an adequate arrangement of the literature in a given focus, it favors the exercises of literature review, synthesis of results, and development of meta-analyses, which are relevant for comparing the different methods and heterogeneous results identified in the literature.

Some of the socio-economic dimensions most impacted by the pandemic were the increase in the number of unemployed in the different economies as well as the fluctuations in economic aggregates such as GDP or National Income.

From an early moment, the first analyses of the economic aggregates' response to the pandemic shock converged on three implications: a significant reduction in domestic and international demand, severe difficulty in recovering the levels of these aggregates before the pandemic shock, and the generalized instability in the labor market and investment markets. Other consequences were also defined with a wide range of insights, from the implications for public finances in different countries to the pressure to increase levels of poverty and income inequality.

Thus, this work will reflect on the publications identified on November 06, 2020, by the search engine of Clarivate Web of Science (Web of Science, 2020). We focused on publications identified by searching for the following simultaneous terms: Covid-19 & GDP; Covid-19 & Unemployment; Covid-19 & Entrepreneurship.

The structure of a bibliometric analysis work follows a well-defined set of steps (Mourao & Martinho, 2020):

- identification of the theme and the sub-themes to be selected;
- identification of sources of significant publications;
- definition of the fields of publications to be searched by the search engines (for example, Title & Abstract, Title & Abstract & Body);
- filtering of the identified publications, eliminating duplications, printed publications before the issue for provisional disclosure, working papers before editing as an article, etc.;
- selection of analysis resources and support software;
- selection of analysis structures (for example, number of publications by theme, co-citations, etc.);
- discussion of each of these analysis structures.

Thus, the following sections will carry out these phases for our work.

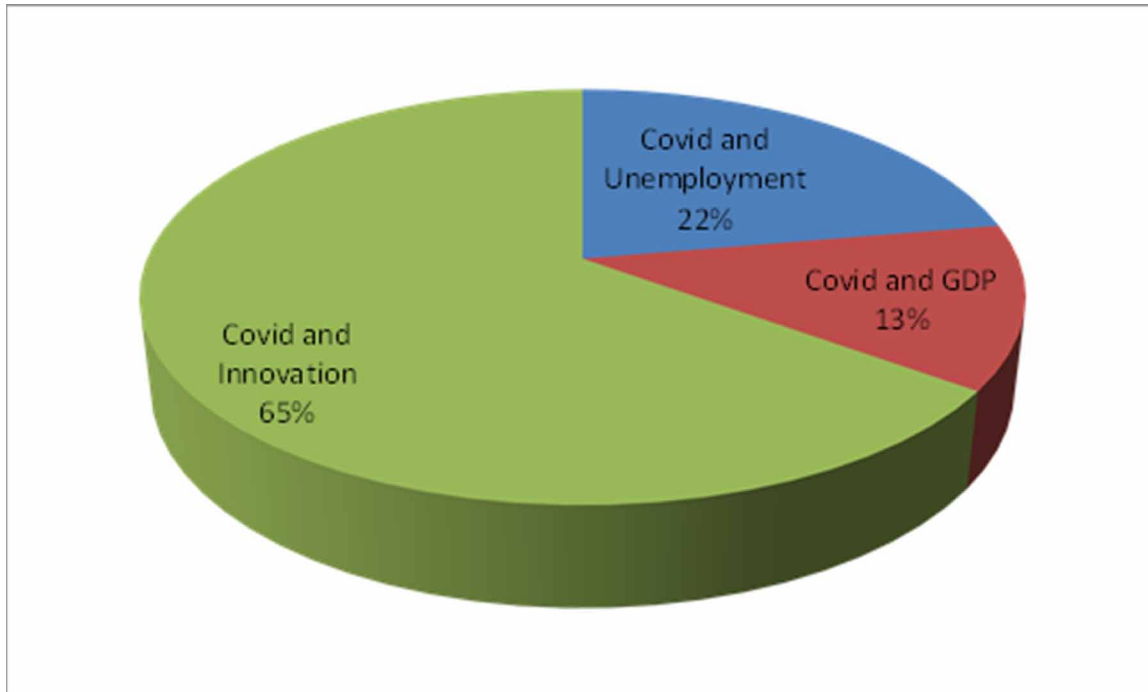
Bibliographic Data Analysis

In this section, the bibliographic information obtained from the Web of Science Core Collection (2020) will be analyzed, separately, for the following topics of search:

- “Covid-19” and “Unemployment”;
- “Covid-19” and “GDP”;
- “Covid-19” and “Innovation”.

All documents were published in 2020, and the great majority addressed the topic “Covid-19” and “innovation” (65% of 691 studies). Only a smaller part focused on the topic “Covid-19” and “GDP” (figure 3). Of the published articles, 22% focused on Covid-19 and Unemployment.

Figure 3. Percentage of documents by search topics in the Web of Science
 Source: Own elaboration with data from WoS (2020)



The research areas related to business economics are those with more records (Table 1). In any case, of highlighting from Table 1, for the group of publications simultaneously identifying Covid-19 and Unemployment, the most frequent research areas are the following: business economics, public environment occupational health, psychiatry, psychology, environmental sciences ecology, general internal medicine, science technology other topics, public administration, and social sciences other topics.

For the group of publications simultaneously identifying Covid-19 and GDP, the most frequent research areas are presented next: business economics, environmental sciences ecology, public environmental occupational health, general internal medicine, geography, science technology other topics, agriculture, engineering, and health care sciences services. For the group of publications simultaneously identifying Covid-19 and Innovation, the following are top research areas: business economics, general internal medicine, health care sciences services, environmental sciences ecology, education educational research, public environmental occupational health, surgery, computer science, and pharmacology pharmacy.

When all of the information (not only the top 15) is analyzed, in general, there is some coincidence in the research areas for the three topics of research with the exception of the topic “Covid-19” and “Innovation,” which seem to encompass more fields. In turn, the research areas associated with anthropology and religion were only addressed in the topic “Covid-19” and “Unemployment,” and the fields related

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to history, mathematical computational biology, and transportation were solely considered in the topic “Covid-19” and “GDP.”

The main language used by the researchers to publish their studies was English, and there is a significant correlation in the rank of most frequent languages for the three topics (Table 2).

Looking at the entire information obtained from the database, there is also a significant correlation in the rank of countries with the affiliations/universities most publishing about these topics. Considering the top 15 countries/regions (Table 3), the USA has more records for the topics “Covid-19 and Unemployment” and “Covid-19 and innovation.” For the topic “Covid-19 and GDP,” China has more records, followed by countries like the USA, India, Italy, Brazil, and Canada.

Table 1. Number of records for the top 15 research areas

Covid and Unemployment		Covid and GDP		Covid and Innovation	
Research Areas	Records	Research Areas	Records	Research Areas	Records
BUSINESS ECONOMICS	38	BUSINESS ECONOMICS	35	BUSINESS ECONOMICS	50
PUBLIC ENVIRONMENTAL OCCUPATIONAL HEALTH	20	ENVIRONMENTAL SCIENCES ECOLOGY	11	GENERAL INTERNAL MEDICINE	39
PSYCHIATRY	17	PUBLIC ENVIRONMENTAL OCCUPATIONAL HEALTH	8	HEALTH CARE SCIENCES SERVICES	29
PSYCHOLOGY	14	GENERAL INTERNAL MEDICINE	6	ENVIRONMENTAL SCIENCES ECOLOGY	27
ENVIRONMENTAL SCIENCES ECOLOGY	13	GEOGRAPHY	6	EDUCATION EDUCATIONAL RESEARCH	26
GENERAL INTERNAL MEDICINE	10	SCIENCE TECHNOLOGY OTHER TOPICS	6	PUBLIC ENVIRONMENTAL OCCUPATIONAL HEALTH	26
SCIENCE TECHNOLOGY OTHER TOPICS	8	AGRICULTURE	3	SURGERY	23
PUBLIC ADMINISTRATION	7	ENGINEERING	3	SCIENCE TECHNOLOGY OTHER TOPICS	22
SOCIAL SCIENCES OTHER TOPICS	7	HEALTH CARE SCIENCES SERVICES	3	SOCIAL SCIENCES OTHER TOPICS	16
SOCIOLOGY	5	OPERATIONS RESEARCH MANAGEMENT SCIENCE	3	COMPUTER SCIENCE	15
AREA STUDIES	3	INFECTIOUS DISEASES	2	PHARMACOLOGY PHARMACY	15
GOVERNMENT LAW	3	PHARMACOLOGY PHARMACY	2	PUBLIC ADMINISTRATION	15
HEALTH CARE SCIENCES SERVICES	3	AREA STUDIES	1	RESEARCH EXPERIMENTAL MEDICINE	15
PEDIATRICS	3	CARDIOVASCULAR SYSTEM CARDIOLOGY	1	PSYCHIATRY	14
SUBSTANCE ABUSE	3	COMPUTER SCIENCE	1	ENGINEERING	13

Source: Own elaboration with data from WoS (2020)

Table 2. Number of records according to language, by search topics in the Web of Science

Covid and Unemployment		Covid and GDP		Covid and Innovation	
Languages	Records	Languages	Records	Languages	Records
ENGLISH	149	ENGLISH	81	ENGLISH	434
SPANISH	2	RUSSIAN	3	PORTUGUESE	5
HUNGARIAN	1	ITALIAN	2	SPANISH	4
PORTUGUESE	1	CHINESE	1	GERMAN	3
RUSSIAN	1	SPANISH	1	ITALIAN	2
				CHINESE	1

Source: Own elaboration with data from WoS (2020)

Table 3. Number of records for the top 15 countries/regions, by search topics in the Web of Science

Covid and Unemployment		Covid and GDP		Covid and Innovation	
Countries/Regions	Records	Countries/Regions	Records	Countries/Regions	Records
USA	59	PEOPLES R CHINA	16	USA	180
ENGLAND	17	USA	13	ENGLAND	73
AUSTRALIA	14	INDIA	8	AUSTRALIA	34
PEOPLES R CHINA	14	ITALY	8	ITALY	32
CANADA	12	BRAZIL	6	CANADA	29
INDIA	9	CANADA	6	PEOPLES R CHINA	27
GERMANY	6	ENGLAND	6	GERMANY	23
SCOTLAND	6	AUSTRALIA	4	INDIA	20
SOUTH AFRICA	5	FRANCE	4	SPAIN	16
SWEDEN	5	GREECE	4	NETHERLANDS	15
FRANCE	4	MEXICO	3	FRANCE	14
POLAND	4	RUSSIA	3	BRAZIL	13
SINGAPORE	4	SAUDI ARABIA	3	SOUTH AFRICA	13
BANGLADESH	3	SPAIN	3	IRELAND	9
BRAZIL	3	GERMANY	2	SWITZERLAND	9

Source: Own elaboration with data from WoS (2020)

We also considered it relevant to try to find significant coefficients of correlation between the values in Table 3 and some variables previously identified as associated with a higher number of scientific publications on a given topic. As we are evaluating products of a scientific nature, previous literature has shown how certain socio-economic dimensions interfere with this value. On the one hand, the scientific community receives positive stimuli when the surrounding conditions stimulate research and the publication of research results. In this vein, authors like Greve et al (2020) showed how Gross Domestic Spending on R&D (% of GDP) has a positive influence on the articles or books published as a result of the investigation. But also pressures from a serious problem that affects the community (Haghani et al,

2020; Handoko, 2021) can be seen as a factor for the same publication values. The Covid-19 pandemic generated important stimuli for academic communities to reflect on the evolution of the problem but also on the search for solutions. Thus, indicators related to the evolution of the pandemic have created additional pressures for researchers based in different countries to move in this effort. Therefore, the evolution of the following indicators may have put pressure on the academic community to investigate critical phenomena, as happened in the past (Li & Xu, 2021): Total cases of infected people, New cases, Total deaths because of Covid-19, New deaths, Total recovered, Active cases, Serious / critical of Active cases, Total cases / 1M pop, or Deaths / 1M pop as well as Total tests. Therefore, we will observe the coefficients of correlation between the values in Table 3 and variables related to a higher incidence rate of Covid-19 in the population and a higher number of researchers or a higher public expenditure in Research and Development. The resulting tables are the next tables 4, 5, and 6 based upon Spearman rank correlation coefficient. Spearman's rank correlation coefficient assesses how well the relationship between two variables can be described by a monotonic function. There is a subtle but relevant difference between Pearson correlation and Spearman correlation (suggested when the two tested variables have a different nature, e.g., when testing a discrete variable against a continuous variable): - while Pearson's correlation assesses linear relationships, Spearman's correlation measures monotonic relationships (may it be linear or not linear).

Tables 4, 5 and 6 were obtained through the Stata software (StataCorp, 2017a, 2017b; Stata, 2020) with data from the World Bank (2020), OECD (2020), and Worldometer (2020). The data from the World Bank and OECD were considered on average for the period 2000-2017. Descriptive statistics for these data are available upon request.

Table 4 reveals that for the top 15 leading countries in terms of the number of records for the topic "Covid-19 and Unemployment," there are strong and positive coefficients of correlations between the gross domestic spending on R&D (% of GDP) and the new Covid-19 cases, total tests, tests/1M population, and the population size. Countries with more population have been found to spend more money on R&D and have also been identified as the countries with more reported new cases of Covid-19. In addition, there is, as expected, a significant correlation between the number of infected people by Covid-19 and variables like total deaths, new deaths, active cases, and serious/critical cases. In turn, the new cases of infected people are correlated with active cases, serious/critical cases, and the number of tests.

For the most productive countries publishing articles for the topic "Covid-19 and GDP" (Table 5), there are positive and strong coefficients of correlations between the gross domestic spending on R&D (% of GDP), the number of researchers per 1,000 employed people, and the total cases/1M population.

Table 6 shows that the leading countries for the topic "Covid-19 and Innovation" exhibit a strong correlation between the number of records found in the Web of Science, the total number of cases of infected people, the number of new cases, the number of total deaths due to Covid-19, the number of total tests, and population size. There are also positive correlations between the domestic general government health expenditure (% of GDP), the total number of tests, and population size. In terms of population, we observed that the denser countries also tend to spend more money on health care.

Table 4. Spearman’s rank correlation between number of records for the top 15 countries/regions found in the Web of Science for the topic “Covid-19 and Unemployment” and other variables related to health expenditure, research expenditure, researchers, and Covid-19 impact

	Records	Domestic general government health expenditure (% of GDP)	Gross domestic spending on R&D Total, % of GDP	Researchers Total, Per 1,000 employed	Total cases	New cases	Total deaths	New deaths	Total recovered	Active cases	Serious, critical	Total cases/1M pop	Deaths/1M pop	Total tests	Tests/1M pop	Population
Records	1.000															
Domestic general government health expenditure (% of GDP)	0.029	1.000														
	(0.957)															
Gross domestic spending on R&D Total, % of GDP	0.638	0.714	1.000													
	(0.173)	(0.111)														
Researchers Total, Per 1,000 employed	0.145	0.771	0.486	1.000												
	(0.784)	(0.072)	(0.329)													
Total cases	0.087	0.657	0.714	0.314	1.000											
	(0.870)	(0.156)	(0.111)	(0.544)												
New cases	0.348	0.714	0.8286*	0.371	0.8857*	1.000										
	(0.499)	(0.111)	(0.042)	(0.469)	(0.019)											
Total deaths	0.116	0.371	0.600	0.143	0.8286*	0.543	1.000									
	(0.827)	(0.469)	(0.208)	(0.787)	(0.042)	(0.266)										
New deaths	-0.058	0.486	0.486	0.257	0.9429*	0.771	1.000									
	(0.913)	(0.329)	(0.329)	(0.623)	(0.005)	(0.072)	(0.072)									
Total recovered	0.551	-0.371	0.314	-0.600	0.257	0.257	0.429	0.200	1.000							
	(0.257)	(0.469)	(0.544)	(0.208)	(0.623)	(0.623)	(0.397)	(0.704)								
Active cases	0.058	0.600	0.543	0.486	0.8857*	0.8286*	0.600	0.9429*	0.029	1.000						
	(0.913)	(0.208)	(0.266)	(0.329)	(0.019)	(0.042)	(0.208)	(0.005)	(0.957)							
Serious, critical	0.087	0.657	0.714	0.314	1.0000*	0.8857*	0.8286*	0.9429*	0.257	0.8857*	1.000					
	(0.870)	(0.156)	(0.111)	(0.544)	(0.000)	(0.019)	(0.042)	(0.005)	(0.623)	(0.019)						
Total cases/1M pop	-0.116	0.257	0.314	0.143	0.8286*	0.543	0.8286*	0.9429*	0.257	0.8286*	0.8286*	1.000				
	(0.827)	(0.623)	(0.544)	(0.787)	(0.042)	(0.266)	(0.042)	(0.005)	(0.623)	(0.042)	(0.042)					
Deaths/1M pop	0.029	0.086	0.257	0.200	0.600	0.257	0.8286*	0.714	0.257	0.600	0.600	0.8857*	1.000			
	(0.957)	(0.872)	(0.623)	(0.704)	(0.208)	(0.623)	(0.042)	(0.111)	(0.623)	(0.208)	(0.208)	(0.019)				
Total tests	0.551	0.771	0.9429*	0.543	0.771	0.9429*	0.486	0.600	0.200	0.714	0.771	0.371	0.200	1.000		
	(0.257)	(0.072)	(0.005)	(0.266)	(0.072)	(0.005)	(0.329)	(0.208)	(0.704)	(0.111)	(0.072)	(0.469)	(0.704)			
Tests/1M pop	0.551	0.771	0.9429*	0.543	0.771	0.9429*	0.486	0.600	0.200	0.714	0.771	0.371	0.200	1.0000*	1.000	
	(0.257)	(0.072)	(0.005)	(0.266)	(0.072)	(0.005)	(0.329)	(0.208)	(0.704)	(0.111)	(0.072)	(0.469)	(0.704)	(0.000)		
Population	0.522	0.600	0.9429*	0.257	0.771	0.771	0.771	0.543	0.486	0.486	0.771	0.429	0.371	0.8286*	0.8286*	1.000
	(0.288)	(0.208)	(0.005)	(0.623)	(0.072)	(0.072)	(0.072)	(0.266)	(0.329)	(0.329)	(0.072)	(0.397)	(0.469)	(0.042)	(0.042)	

Note: Statistical significant at 5%. The data related to total cases, new cases, total deaths, new deaths, total recovered, active cases, serious/critical cases, total cases/1M pop, deaths/1M pop, total tests and teste/1 M pop are relative to the Covid-19 pandemic.

Source: Own elaboration with data from WoS (2020), World Bank (2020), OECD (2020) and Worldometer (2020)

Table 5. Spearman's rank correlation between number of records for the top 15 countries/regions found in the Web of Science for the topic "Covid-19 and GDP" and other variables related to health expenditure, research expenditure, researchers and Covid-19 impact

	Records	Domestic general government health expenditure (% of GDP)	Gross domestic spending on R&D Total, % of GDP	Researchers Total, Per 1,000 employed	Total cases	New cases	Total deaths	New deaths	Total recovered	Active cases	Serious, critical	Total cases/1M pop	Deaths/1M pop	Total tests	Tests/1M pop	Population
Records	1.000															
Domestic general government health expenditure (% of GDP)	0.193 (0.647)	1.000														
Gross domestic spending on R&D Total, % of GDP	0.313 (0.450)	0.8810* (0.004)	1.000													
Researchers Total, Per 1 000 employed	0.217 (0.606)	0.8095* (0.015)	0.7381* (0.037)	1.000												
Total cases	0.313 (0.450)	0.286 (0.493)	0.452 (0.260)	0.286 (0.493)	1.000											
New cases	0.398 (0.329)	0.310 (0.456)	0.619 (0.102)	0.167 (0.693)	0.7381* (0.037)	1.000										
Total deaths	0.325 (0.432)	-0.024 (0.955)	0.191 (0.651)	-0.167 (0.693)	0.7857* (0.021)	0.571 (0.139)	1.000									
New deaths	0.446 (0.268)	0.167 (0.693)	0.310 (0.456)	-0.071 (0.867)	0.8571* (0.007)	0.691 (0.058)	0.9048* (0.002)	1.000								
Total recovered	-0.024 (0.955)	-0.214 (0.610)	0.214 (0.610)	-0.167 (0.693)	0.571 (0.139)	0.643 (0.086)	0.667 (0.071)	0.476 (0.233)	1.000							
Active cases	0.349 (0.396)	0.429 (0.289)	0.548 (0.160)	0.238 (0.570)	0.9286* (0.001)	0.7857* (0.021)	0.7143* (0.047)	0.9048* (0.002)	0.429 (0.289)	1.000						
Serious, critical	0.313 (0.450)	0.524 (0.183)	0.595 (0.120)	0.191 (0.651)	0.8095* (0.015)	0.667 (0.071)	0.7619* (0.028)	0.9048* (0.002)	0.357 (0.385)	0.9286* (0.001)	1.000					
Total cases/1M pop	0.518 (0.188)	0.619 (0.102)	0.7381* (0.037)	0.524 (0.183)	0.8333* (0.010)	0.8333* (0.010)	0.476 (0.233)	0.7143* (0.047)	0.286 (0.493)	0.9048* (0.002)	0.7857* (0.021)	1.000				
Deaths/1M pop	0.615 (0.105)	0.024 (0.955)	0.167 (0.693)	-0.119 (0.779)	0.619 (0.102)	0.548 (0.160)	0.8571* (0.007)	0.8095* (0.015)	0.381 (0.352)	0.571 (0.139)	0.619 (0.102)	0.476 (0.233)	1.000			
Total tests	0.145 (0.733)	0.333 (0.420)	0.667 (0.071)	0.286 (0.493)	0.7143* (0.047)	0.9286* (0.001)	0.452 (0.260)	0.452 (0.183)	0.7381* (0.037)	0.7143* (0.047)	0.571 (0.139)	0.7619* (0.028)	0.286 (0.493)	1.000		
Tests/1M pop	0.337 (0.414)	0.310 (0.456)	0.619 (0.102)	0.262 (0.531)	0.691 (0.058)	0.9524* (0.000)	0.381 (0.352)	0.548 (0.160)	0.595 (0.120)	0.7381* (0.037)	0.548 (0.160)	0.8333* (0.010)	0.310 (0.456)	0.9524* (0.000)	1.000	
Population	-0.121 (0.776)	-0.048 (0.911)	0.286 (0.493)	0.000 (1.000)	0.7381* (0.037)	0.595 (0.120)	0.7143* (0.047)	0.571 (0.139)	0.9286* (0.001)	0.595 (0.120)	0.524 (0.183)	0.405 (0.320)	0.333 (0.420)	0.7381* (0.037)	0.571 (0.139)	1.000

Note: Statistical significant at 5%. The data related to total cases, new cases, total deaths, new deaths, total recovered, active cases, serious/critical cases, total cases/1M pop, deaths/1M pop, total tests and tests/1 M pop are relative to the Covid-19 pandemic.

Source: Own elaboration with data from WoS (2020), World Bank (2020), OECD (2020) and Worldometer (2020))

Table 6. Spearman's rank correlation between number of records for the top 15 countries/regions found in the Web of Science for the topic "Covid-19 and Innovation" and other variables related to health expenditure, research expenditure, researchers and Covid-19 impact

	Records	Domestic general government health expenditure (% of GDP)	Gross domestic spending on R&D Total, % of GDP	Researchers Total, Per 1 000 employed	Total cases	New cases	Total deaths	New deaths	Total recovered	Active cases	Serious, critical	Total cases/IM pop	Deaths/IM pop	Total tests	Tests/IM pop	Population
Records	1.000															
Domestic general government health expenditure (% of GDP)	0.551 (0.157)	1.000														
Gross domestic spending on R&D Total, % of GDP	0.036 (0.933)	0.214 (0.610)	1.000													
Researchers Total, Per 1,000 employed	0.216 (0.608)	0.691 (0.058)	0.381 (0.352)	1.000												
Total cases	0.7545* (0.031)	0.691 (0.058)	0.143 (0.736)	0.238 (0.570)	1.000											
New cases	0.8862* (0.003)	0.619 (0.102)	0.333 (0.420)	0.191 (0.651)	0.8571* (0.007)	1.000										
Total deaths	0.7785* (0.023)	0.476 (0.233)	-0.048 (0.911)	0.024 (0.955)	0.9524* (0.000)	0.8095* (0.015)	1.000									
New deaths	0.683 (0.062)	0.476 (0.233)	0.333 (0.420)	0.048 (0.911)	0.9048* (0.002)	0.9048* (0.002)	0.8810* (0.004)	1.000								
Total recovered	0.623 (0.099)	0.095 (0.823)	0.000 (1.000)	-0.357 (0.385)	0.548 (0.160)	0.548 (0.160)	0.643 (0.086)	0.500 (0.207)	1.000							
Active cases	0.647 (0.083)	0.667 (0.071)	0.524 (0.183)	0.429 (0.289)	0.8333* (0.010)	0.8810* (0.004)	0.7143* (0.047)	0.9048* (0.002)	0.214 (0.610)	1.000						
Serious, critical	0.647 (0.083)	0.595 (0.120)	0.238 (0.570)	0.143 (0.736)	0.9762* (0.000)	0.8333* (0.010)	0.9286* (0.001)	0.9524* (0.000)	0.524 (0.183)	0.8571* (0.007)	1.000					
Total cases/IM pop	0.060 (0.888)	-0.048 (0.911)	0.500 (0.207)	0.071 (0.867)	0.405 (0.320)	0.333 (0.420)	0.405 (0.320)	0.619 (0.102)	0.024 (0.955)	0.619 (0.102)	0.548 (0.160)	1.000				
Deaths/IM pop	0.323 (0.435)	0.000 (1.000)	0.048 (0.911)	0.000 (1.000)	0.500 (0.207)	0.452 (0.260)	0.595 (0.120)	0.667 (0.071)	0.000 (1.000)	0.619 (0.102)	0.571 (0.139)	0.8095* (0.015)	1.000			
Total tests	0.8743* (0.005)	0.7143* (0.047)	0.262 (0.531)	0.191 (0.651)	0.8810* (0.004)	0.9524* (0.000)	0.8095* (0.015)	0.8333* (0.010)	0.667 (0.071)	0.7857* (0.021)	0.8333* (0.010)	0.167 (0.693)	0.238 (0.570)	1.000		
Tests/IM pop	0.359 (0.382)	0.310 (0.456)	0.238 (0.570)	0.214 (0.610)	0.333 (0.420)	0.476 (0.233)	0.286 (0.493)	0.452 (0.260)	0.024 (0.955)	0.571 (0.139)	0.357 (0.385)	0.476 (0.233)	0.500 (0.207)	0.405 (0.320)	1.000	
Population	0.7306* (0.040)	0.7381* (0.037)	0.262 (0.531)	0.191 (0.651)	0.9286* (0.001)	0.8571* (0.007)	0.8333* (0.010)	0.8333* (0.010)	0.667 (0.071)	0.7619* (0.028)	0.9048* (0.002)	0.238 (0.570)	0.214 (0.610)	0.9524* (0.000)	0.333 (0.420)	1.000

Note: Statistical significant at 5%. The data related to total cases, new cases, total deaths, new deaths, total recovered, active cases, serious/critical cases, total cases/IM pop, deaths/IM pop, total tests and tests/IM pop are relative to the Covid-19 pandemic.

Source: Own elaboration with data from WoS (2020), World Bank (2020), OECD (2020) and Worldometer (2020)

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Table 7. Number of records for the top 15 sources' titles, by search topics in the Web of Science

Covid and Unemployment		Covid and GDP		Covid and Innovation	
Source Titles	Records	Source Titles	Records	Source Titles	Records
INTERNATIONAL JOURNAL OF ENVIRONMENTAL RESEARCH AND PUBLIC HEALTH	6	ENVIRONMENTAL RESOURCE ECONOMICS	4	SUSTAINABILITY	11
JOURNAL OF PUBLIC ECONOMICS	4	INTERNATIONAL JOURNAL OF ENVIRONMENTAL RESEARCH AND PUBLIC HEALTH	3	OMICS A JOURNAL OF INTEGRATIVE BIOLOGY	9
NATIONAL TAX JOURNAL	4	JOURNAL OF RISK AND FINANCIAL MANAGEMENT	3	INDUSTRIAL MARKETING MANAGEMENT	6
AIR QUALITY ATMOSPHERE AND HEALTH	2	CUREUS	2	INTERNATIONAL JOURNAL OF ENVIRONMENTAL RESEARCH AND PUBLIC HEALTH	5
AMERICAN JOURNAL OF PUBLIC HEALTH	2	DOCUMENTI GEOGRAFICI	2	CANADIAN JOURNAL OF PUBLIC HEALTH REVUE CANADIENNE DE SANTE PUBLIQUE	4
BMJ BRITISH MEDICAL JOURNAL	2	INTERNATIONAL ECONOMICS AND ECONOMIC POLICY	2	CLINICAL MEDICINE	4
EUROPEAN SOCIETIES	2	JOURNAL OF HEALTH MANAGEMENT	2	INTERNATIONAL SMALL BUSINESS JOURNAL RESEARCHING ENTREPRENEURSHIP	4
FISCAL STUDIES	2	REGIONAL SCIENCE POLICY AND PRACTICE	2	JOURNAL OF MEDICAL INTERNET RESEARCH	4
FRONTIERS IN PSYCHIATRY	2	SAFETY SCIENCE	2	OTOLARYNGOLOGY HEAD AND NECK SURGERY	4
GLOBALIZATION AND HEALTH	2	SUSTAINABILITY	2	CUREUS	3
INTERNATIONAL JOURNAL OF SOCIOLOGY AND SOCIAL POLICY	2	AFRICAN SECURITY REVIEW	1	ENERGY RESEARCH SOCIAL SCIENCE	3
JAMA JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION	2	ANNALS OF GLOBAL HEALTH	1	JOURNAL OF INTERPROFESSIONAL CARE	3
JOURNAL OF AFFECTIVE DISORDERS	2	APPLIED ECONOMICS	1	JOURNAL OF PARKINSON'S DISEASE	3
JOURNAL OF PAEDIATRICS AND CHILD HEALTH	2	APPLIED ECONOMICS LETTERS	1	JOURNAL OF PUBLIC AFFAIRS	3
JOURNAL OF PUBLIC AFFAIRS	2	ASIA PACIFIC JOURNAL OF BUSINESS ADMINISTRATION	1	NATURE MEDICINE	3

Source: Own elaboration with data from WoS (2020)

The journals with more records for the topic “Covid-19” and “Unemployment” are the International Journal of Environmental Research and Public Health, the Journal of Public Economics and the National Tax Journal (Table 7). The International Journal of Environmental Research and Public Health also appears in the topic “Covid-19” and “GDP” jointly with Environmental Resource Economics and the Journal of Risk and Financial Management. The publications with more records in the topic “Covid-19” and “Innovation” are Sustainability, OMICS: a Journal of Integrative Biology, and Industrial Marketing Management. In general, the most productive sources are not from the economic mainstream, which asks for a deeper reflection in future research.

CONCLUSION

This work reflected on a bibliometric analysis related to the publications identified by the “Clarivate Web of Science,” that, in the first year of the Covid-19 pandemic, focused the analysis on issues associated with the pandemic identified as Covid-19 and some of the most affected economic areas, namely Unemployment, Production, and Income of the different economies.

On the one hand, we observed a special growth in the number of publications dedicated to Covid-19 in the various journals indexed by Clarivate. On the other hand, we observed that not only have publications associated with Health Sciences received an extremely significant growth in submissions and articles accepted for publication focused on Covid-19, but publications traditionally concentrated in the social areas have also witnessed an increasing focus on the problem. When such a flow was observed, a bibliometric reflection on the direction these publications were taking became relevant.

Therefore, we analyzed the journals with greater attention on the issue as well as the most productive countries. In addition to a greater understanding of the structural networks that support the published research work, a bibliometric analysis also allows for a greater definition of the trends in the literature. Journals like the International Journal of Environmental Research and Public Health, the Journal of Public Economics and the National Tax Journal (Table 7) are the journals with more records for the topic “Covid-19” and “Unemployment” The International Journal of Environmental Research and Public Health also appears in the topic “Covid-19” and “GDP” jointly with Environmental Resource Economics and the Journal of Risk and Financial Management as the leading sources. The publications with more records in the topic “Covid-19” and “Innovation” were Sustainability, OMICS: a Journal of Integrative Biology, and Industrial Marketing Management.

For further challenges derived upon this descriptive work, we suggest three. The first relates to a deepening of the network of authors and citations of these topics, enabling the observation of team-working capacity in these areas. The second relates to a more detailed work upon the correlation that we found as statistically significant here. In this line, it will be important to clarify whether there were more publications from more infected countries or more publications from these countries because there are more researchers in these countries. The third challenge relates to meta-analyses developed upon the identified articles in order to clarify the most converging results and the divergent ones.

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APPENDIX

Descriptive Statistics (of Variables From Tables 4, 5, and 6)


	Mean	Std.Dev.	Max.	Min.
Records1	11.78571	14.76575	59	3
Records2	6.071429	4.08495	16	2
Records3	33.78571	45.10531	180	9
Domestic general government health expenditure (% of GDP)	4.780118	2.84924	8.305495	0.497861
Gross domestic spending on R&DTotal. % of GDP	1.943488	0.783746	3.345302	0.722737
ResearchersTotal. Per 1 000 employed	7.19743	3.303155	12.04056	1.437752
Total cases	2468553	3849363	12277827	27792
New cases	29766.46	54555.31	204179	4
Total deaths	52963.36	78873.11	260331	28
New deaths	484.1818	561.6358	1999	12
Total recovered	1984385	3144033	8475897	25511
Active cases	698710.8	1366968	4700436	57
Serious. critical	4409.667	6577.959	22789	1
Total cases/1M pop	15265.14	11796.54	37008	60
Deaths/1 M pop	362.4286	322.2638	798	3
Total tests	44012962	62108706	1.77E+08	2622559
Tests/1M pop	283844	211855.5	720468	15863
Population	2.81E+08	4.88E+08	1.44E+09	5868240

Records1: Covid-19 and Unemployment
 Records2: Covid-19 and GDP
 Records3: Covid-19 and Entrepreneurship

Chapter 23

Organic Food Production and Consumption Policies and Strategies

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ABSTRACT

This chapter aims to analyze the main factors of the production and consumption of organic products, as well as their policies and strategies. The analysis is based on the premise of the sustainable development of the production, distribution, and consumption systems of organic products that have the potential to improve the quality of life levels of producers, consumers, and society. It is concluded that the production and consumption of organic food is based on a more favorable agriculture, as well as by providing more nutritious and healthy food for consumption.

INTRODUCTION

Current food systems have become highly dependent on oil. Food system emissions from production to consumption, contribute with more than 20% of global greenhouse gas emissions (Vermeulen et al, 2012). Dependence of the food system on fossil fuels has a high environmental impact on human diets. Organic food production is limited by environmental destruction due to the countryside crisis. Agricultural industrial practices degrade food systems with contaminated and poor-quality products, with ecological services and ecosystems that worsen the quality-of-life conditions. In the consumer society in which one lives, consumers who are submissive to advertising and the influence of the media have developed a reduced capacity in making purchase and consumption decisions in such a way that the products acquired to meet the needs, are used, and are thrown away.

Consumerism is expressed in the acquisition of unnecessary and superfluous products, as well as exceeding in the purchase of basic goods, whether basic needs are met. The food called “junk” gener-

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ates damage to people's health and the environment due to the overexploitation of natural resources and pollution.

Alternative, agro ecological and organic agriculture as ways of life, integrate the traditional knowledge of indigenous peasants with the knowledge derived from the advances and innovations of science and technology to conserve natural resources, improve biodiversity and ecosystems to produce food healthy ones of better nutritional quality, and in a fair working environment (Torres Serrano, 2002). Organic products do not use agrochemicals to generate a self-sustaining production system, which is based on natural inputs and good agro ecological practices. The aim of this sustainable production system is to care for and protect the environment, harvest fresh and process products free of toxic waste.

Agro ecological and organic food production is interconnected and interdependent human, nature, and ecological processes more focused on conservation and food affordability. It is possible to feed the growing population considering the interactions, interdependencies, and feedbacks of the technological, economic, social, and environmental dimensions of a sustainable agro ecological systems (De Schutter, 2014, *The Economics of Ecosystems and Biodiversity TEEB 2015*)

Organic and agro ecological food are alternatives to those products of large-scale industrialized agricultural origin, they are free of fungicides, pesticides, agrochemicals, herbicides, and antibiotics. The responsible consumption of organic food products takes into consideration the environmental impact of the production, distribution processes including logistics and transport, consumption and waste, the ecological footprint of lifestyles and human rights to consumption. The consumption of organic products is a worldwide trend because of a change of materialistic values to post-materialists based on a greater interest in improving the quality of life, biodiversity and sustainable environment, personal self-realization, democratic society, inclusion, and social justice, etc.

The concept of food justice as an attribute of agro ecology and organic food systems is being used by government agencies, community and social organizations and some academics (Cadieux & Slocum 2015). Food justice movement calls about the disparities and dysfunctionalities perpetuated in the dominant and traditional food systems and the alternative agro ecological and organic food systems as well as the disparities that exist from production, distribution, and consumption in any food system (Alkon & Agyeman, 2011).

Agro ecological and organic food justice advocates engage in urban agro ecology with the aim of expanding access to healthy food (Rajan & Duncan, 2013; Mares & Alkon, 2011; Reynolds & Cohen, 2016). The agro ecological and organic food justice movement brings awareness on the disparities embedded in any agro ecological and organic food systems, advocates policies, strategies, and practices such as place-based projects in urban agro ecology and tries to change the food system using politics to achieve more fair food system (Santo, Palmer, & Kim, 2016).

The sustainable development of the production, distribution and consumption systems of organic products improves the levels of quality of life of producers, consumers, and society, by having more favorable agriculture of the ecological and the environment, as well as by providing food more nutritious and healthier for consumption. The sustainable production of organic food products is a function of the recovery, care and conservation of natural resources, biodiversity, and the ecosystem.

The concern for sustainable, environmental, and ecological development is related to the variable's education, income, socio-economic level, and occupational prestige, although these relationships are very ambiguous and do not confirm hypotheses of positive association. The relationship between the level of education and the tendency to carry out ecological and environmental actions is in favor of those who have more awareness and availability are those who have a higher level of schooling. The trend

in organic food consumption has created a demand for green products that is more related to market segments that have high levels of income and spend less of their income to meet their needs (Gómez, Gómez & Schwentesius, 2002).

Organic food products are associated with natural foods that are produced by traditional and artisanal methods, so they taste better, are more expensive than those produced under industrial agriculture schemes because they are made without dyes, additives, pesticides, fungicides, and other chemicals synthetic. However, agro ecology and organic place-based projects have limitations to overcome the structural inequities in the organic food system due to demographic, socioeconomic and political power asymmetries (Broad, 2016).

Organic products are promoted from large trading companies that offer investments and financing to private producers to increase the supply to consumers at the best price and in the required time (Gómez et al., 2000). Organic products go through verification, inspection, certification, and validation processes by international organizations. These actions are not only because they do not use synthetic inputs. The production and consumption of organic food generate trust and affinity towards the care and conservation of biodiversity and natural ecosystems.

ORGANIC PRODUCTION

Each organic product has its own production process which makes it unique (Florencia, 2013). The environmental and health impact of people in the production processes can be reduced with the sustainable consumption of organic products and ecological services considering that the critical factor is the natural resources, inputs and energy used. Organic, biological, and ecological agricultural production systems use natural inputs and reject synthetic chemical inputs such as fertilizers, pesticides, fungicides, insecticides, seeds, and other genetically modified organisms. Organic products are those that use biodegradable natural resources or that are recyclable and reject the use of synthetic chemical inputs.

The development of organic, ecological, and biological production systems is based on ecological principles and agro ecological practices aimed at improving the well-being, health, and economic and social living conditions of humans, as well as aimed at achieving environmental sustainability. The organic production system is based on the implementation of specific practices and standards applied that are economically efficient, socially inclusive, and fair, and ecologically sustainable. Some of the special practices used by organic production systems are the use of compost and green manures, crop rotation, biological control, natural plant repellents, and so on.

The production costs of organic foods are lower than conventional products because their production requires fewer transformation processes. However, they are more expensive in the market due to their quality since their production is based on natural processes and do not require pesticides and fertilizers.

The agro ecological revolution in Latin America (Altieri & Toledo, 2011) is concerned with issues of agro ecology-based agricultural production, food sovereignty, agro exports and biofuels expansion. The development of production systems for organic agriculture in Mexico is driven by Mexican producers that serve the national market and with the support of foreign agents to meet the demand in the global markets for tropical and organic agro products and tropical and winter season. Green, agro ecological, organic, biological, and ecological products that are destined for local consumption have the opportunity of the existing demand in the food market.

Foreign food producers in Mexico have taken advantage of the availability of abundant raw material at very low costs. Besides, they have received many benefits that have allowed them to enter the market with the production of altered foods. Mexican producers use their resources, with the support of State programs and with the experience of international agents and producers. Organic agriculture in Mexico is linked to the poorest rural sectors, one of them being indigenous groups. In Mexico, the organic food and product sectors are growing, with exports to the markets of the United States and the European Union. The potential for organic food production in Mexico is 169 thousand hectares (SAGARPA, 2015). SAGARPA has implemented the Organic Seal as a certification mechanism that gives certainty and added value to production.

CONSUMPTION OF ORGANIC PRODUCTS

Food-based on organic products is adopted as a healthy and nutritional lifestyle from childhood and later at any stage of people's lives when they need to improve their diet due to health problems. The food consumer chooses goods with import and transgenic origin, which result in an increase in obesity rates. This situation has compromised a social health problem and other food problems that affect people's health. Among the different consumption options available, there are those of organic products that reduce the damage and harm to the environment during its life cycle (Calomarde, 2000).

The needs, tastes and fears of consumers create demand for organic products and structure food production systems (Bueno Castellanos & Ayora Díaz, 2010). The demand for organic products and ecological services expands in the markets with the development of organic and agro-ecological agriculture.

The trend of sustainable consumption based on organic products is increasing because industrial production of food contains synthetic chemicals such as pesticides, herbicides, pesticides, fungicides, and genetically modified organisms that cause harmful damage to health and result in consumer diseases and that pollute the environment. Organic products go through verification, inspection, certification, and validation processes by international organizations and not only because they do not use synthetic inputs.

Green food consumption is a marketing trend that focuses on actions of purchasing and consumption processes that are intended to take care of the environment. Organic foods are sustainable because they do not contaminate and care for the elements of nature with agrochemicals. The consumption of sustainable organic products is the result of a motivation based on the construction of emotional bonds of consumers towards the elements of nature. The amount of energy and resources used is the critical factor in the sustainable consumption of an organic product because it helps reduce the environmental impact.

Sustainable consumer behavior tends to reduce the use and consumption of natural resources, toxic and polluting materials, and supplies. The emissions of organic and inorganic waste have implications on the satisfaction needs of future generations. The behavior of the buyer and sustainable consumer of organic products and ecological services to satisfy not only their basic needs, but also to avoid fears and fulfil the satisfaction by improving health and quality of life conditions.

Some of the factors and reasons that influence the behavior of the buyer and the consumer for the consumption of food products are considered on the desired to have a new lifestyle. This new lifestyle is defined by the satisfiers who acquire, consume and use, sustained by the biodiversity and ecosystems with the support of producers and consumers. The model of lifestyle dimensions tries to explain that consumers of organic products receive a higher income, have a profile with tendencies to be prone to behaviors related to exercising and caring for the environment.

The distrust of consumers to organic products increases the uncertainty and complexity of the processes of production, distribution, and commercialization of the food system in the places of acquisition. However, many of the consumers do not know or they cannot distinguish the labels of products that are organic, do not find the advantages of organic products over conventional ones, or they do not trust them (MAPAMA, 2016, a, b). Therefore, organic food products are not the most consumed due to reasons such as ignorance, expensive prices, and difficulties in finding them.

Consumption of food made from organic products is not exposed to foods that are chemically altered as in the nutritional trends of vegetarianism and veganism. Veganism and vegetarianism are food trends based on habits of eating healthy foods free of pesticides, fungicides, synthetic chemicals, and no animal-derived supplies. The purchase processes for the consumption of organic products consider environmental and health factors as the basis of healthy and sustainable consumption.

The consumption of organic products is related to lifestyles with an ecological and sustainable orientation and awareness based on reflexive knowledge and environmental practices associated with attitudes and other psychological variables. Although the consumer adapts to their food needs, however, it is increasingly demanding because it has the potential to improve their satisfaction according to their demand levels. Therefore, producers and distributors need to focus on offering higher quality organic products, with better presentation, information and adaptation to the needs and requirements of the consumer (MAPAMA, 2016, a, b).

The consumption of organic products drives local and regional economies. In addition, they are being characterized by being responsible and supportive. Solidarity consumption considers labor conditions and the fair price of the processes of production, distribution, and consumption of the product. Economic factors influence the decision to purchase organic food products from consumers by purchasing power considering that prices are higher than conventional products. Among the economic factors that influence consumer behavior are the economic environment, the price conditions, purchasing power, salaries, cost of capital, availability of money and credit, supply, demand, and inventory levels of agro ecological and organic products that have an impact directly in purchasing decisions (Di Sante Villa, 2009).

The decision to buy these products depends on the purchasing capacity. In this sense, organic products are considered as aspirational and belonging, passing first the needs of health, care and protection of the environment, promotion of artisanal production, etc. Urban agro ecology contributes to develop skills and capacity building and education of participants who learn about the natural environment in cultivating organic food (Okvat & Zautra, 2011). Urban agro ecology for food production in urban spaces restrained by environmental conditions, represents a challenge for innovation, such as intensified technologies for plant growing, use of soilless for production such as idle and underutilized land, roofs, walls, vacant lots, brownfields, underground under artificial lighting (Solon, 2014; Osborne, 2015; Opitz et al., 2016; Mok et al., 2014).

The fair price for organic food producers seeks to obtain fair profits from the sale of their crops to market intermediaries (UNEP, 2011). Organic food goods tend to have a higher price than conventional products, which are not necessarily self-sustaining or supportive. Fairtrade is a movement that aims to promote responsible consumption by giving producers direct access to markets to reduce poverty. Fairtrade and solidarity consumption promote equality among all agents in the production-consumption chain.

The small producers of the South and South Coast of Jalisco have developed models of agricultural production and organic beekeeping and marketing for solidarity markets. These models have a strong focus on sustainable development that benefits local economies. Producers have full awareness of the

care and conservation of natural resources under a holistic conception by using organic farming techniques (González & Nigh, 2005).

The care of the environment is a demanded norm that is socially accepted as necessary and explains the ecological behavior of people. Concerned about the increasing ecological degradation of the environment, some consumer segments show a buying and consuming behavior of organic products and foods that contribute to improving their health and reducing the negative impact on ecosystem degradation. The consumption of organic food products is currently concentrated only in some segments of the market that have the profile of being more demanding in quality, who know the origin, content, and the benefits they provide. Market factors are price, product, logistics and distribution, and promotion and communication. These consumers are of the high level of education and with high income and are willing to pay a more expensive price than normal to acquire the satisfactory goods.

Consumer behavior is the process of selection, purchase, use and disposal of products and services, ideas and experiences that meet the needs and desires of consumers (Solomon, 2008). Consumer behavior is defined as the process and activities in which individuals participate to search, choose, select, buy, use, evaluate, acquire, and dispose products and services meeting their needs and desires (Belch & Belch, 2008). Consumer behavior tries to investigate the reasons why consumers buy, use, or give away what, how, where, when, how much, how often, for how long (Hoyer, 2010).

In consumer behavior, the consumer manifests itself as a set of multiple independent factors that interrelate with each other. The behavior of consumers or users results from stimuli, ideas, motivations, experiences, needs, desires, and fears that are influenced by both internal and external factors. The consumer decision-making process occurs with the influence of the underlying economic, social, cultural, individual, and psychological factors from the moment of the perception of previous stimuli to post-purchase behaviors (Lamb, Hair, & McDaniel, 2011).

The psychological factors that influence the behavior of the consumer of organic products when making purchasing decisions are based on tools that recognize the needs, perception, motivations, attitudes, desires, fears, beliefs, learning, feelings, habits, decisions, etc., to gather information required in the decision-making processes.

Motivation is an internal driving force of the person that occurs in a tension pushing the action to meet the needs (Schiffman & Kanuk, 2001). The motivation of people is the strength to obtain biological, economic, and social survival objectives. Freud assumes that people are not aware of psychological forces and repress their impulses in their human development.

In the theory of learning, the behaviorist is based on the association of Aristotle and the empirical theory of Hume who argues that knowledge is constituted of impressions or data received through the senses and ideas that are copies in the mind of impressions (Rodríguez Garrido & Larios de Rodríguez, 2006). Behaviorism is interested in objective explanations based on observable behaviors and based on the stimulus-response association without considering the will of the subject.

Cognitive theory, as a response to behaviorism, explains higher mental processes such as cognition when the subject that interacts with the environment generates responses.

Human behavior is caused by cultural values, desires, etc., acquired through family and social institutions. Every culture has as defining elements its socially shared values and beliefs in an enduring way. It is difficult to change or modify cultural values and shared beliefs, considering that the person internalizes them since he learns them, and adopts them because he grows with them. This is the case of the cultural values of the Mexican inserted in its idiosyncrasy. The experiences that individuals have are reaffirming or modifying their personality characteristics.

The social factors that influence the purchasing and consumption decision-making processes are those with which individuals interact informally or formally such as family, school, religious groups, aspiration and reference groups, opinion leaders, etc.

Some of the variables of the buyer behavior and the ecological consumer that influence the decision-making processes of purchase and consumption of organic foods are the values, attitudes, beliefs, motivations, as well as socio-demographic and educational variables. Besides, among other factors that influence the behavior of the consumer of organic foods are the price, quality, flavor, health benefits, freshness, frequency of consumption, brand, purchasing power and purchasing power, gender, age, etc.

People's age correlates positively with ecological awareness, environmental concern, and the consumption of organic products. In terms of gender, it is women who are most aware as consumers of the benefits of organic food, are consistent and participate intensively in ecological activities and environmental prevention. Therefore, the degree of schooling of buyers and consumers has a significant positive effect on the sustainable consumption of organic foods.

The behavior of consumers and buyers in their decision-making processes on organic products are influenced by internal factors that come from individual needs, tastes, and fears, which are interpreted according to external stimuli and according to the psychological structure and Personal characteristics. Needs, desires, and fears are personal factors that motivate the will of individuals to make purchasing decisions and consume satisfactory, mediated by personal characteristics such as personality traits, gender, age, educational level, profession, maturity level, people's lifestyle, etc. (Rodriguez Ardura, 2006).

The ecological concern and awareness of respect and care for the environment are motivated by the satisfaction of more universal individual and collective needs that go beyond basic and survival needs.

Variables that have influence, such as health, price, quality, available information on customer specifications, product presentation, socio-economic factors, etc., enter consumer decision-making processes. The specifications of organic products and foods usually are very poor in terms of satisfaction of needs, the fulfillment of wishes, avoidance of fears, perception of health benefits and environmental impact, so more information is required.

Making simple or complex decisions to buy and consume ecological or organic satisfiers depends on their commitment to potential solutions, whether they are at the level of survival or at their most complex level of self-realization (Rivas & Grande, 2013). Depending on the level of complexity is the information necessary for the evaluation of alternatives. Buyers seek congruence with their perceptions, their information, their opinions, and attitudes to justify their purchase decision decisions, because of complex interactions of psychological, social, cultural factors, etc.

Health and socio-demographic variables are two relevant factors in decision-making processes of organic food in the behavior buyers and consumers. The personal characteristics that influence and have direct effects on the ecological behavior of people and their decision-making processes for the purchase and consumption of organic products correspond to the sociodemographic variables. When consumers know what their specific need to feed with organic food is, they get involved in a decision that has a limited solution due to the different influential factors, such as health, support for local producers, commitment to care and protection of the environment, etc.

The purchase and consumption of organic food products show a consumer behavior that has a willingness to pay a higher price than the common products, some called scrap, which are of a more industrial agricultural production. The production of organic products and food for local consumption adjusts its price to offer an affordable price according to the conditions of the consumers.

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When the consumer is involved in several purchase decisions simultaneously, the result of one decision can affect the others at the different stages of the process, whether is due to external influences in their entry phase, or to a process in decision making and behavior after the decision (Schiffman & Kanuk, 2001).

The processes of buyer and consumer behaviors in the decision making of organic products and ecological services, show discrepancies in factors such as awareness, ecological concerns and buying actions. Consumer behavior is guided by goals and purposes.

People's reality is based on differences in personality, motives, experiences, interests, level of influence, etc., factors that determine the purchase and consumption decisions of organic satisfiers. Some of these situational factors are the physical environment, the social environment, and the definition of tasks in which the purchase and consumption activities are carried out. Among the physical aspects of the environment, the location and environment of the establishment, density of consumers, etc. In the social environment, aspects such as communication and social motivation of purchase are considered. In the definition of tasks, the reasons for purchase and consumption, purpose, and purchase process, etc. are considered.

The purchase factors induce an individual to acquire a specific organic product in the purchase decision and make it essential in the cupboards by creating dependency with the fulfilment of the expectations. Satisfiers are accepted or rejected based on what consumers perceive as relevant to meet their needs, desires, and lifestyles (Blackwell, Miniard, & Engel, 2002).

POLICIES AND STRATEGIES

Food may be a source of unsustainability due to how metabolism is satisfied and the impact it has on total energy consumption. This makes sustainable decline a priority strategy for the production, distribution of organic food and responsible consumption (Infante & González De Molina, 2010; González de Molina, & Simón Fernández, 2010; González de Molina, 2010, 2009). Organic production is a strategy to reduce the environmental impacts of industrial agriculture, such as the green revolution, dependent on synthetic inputs, to provide a healthy and nutritious diet that the population needs. Consumers of food products show different behaviors according to their motivations, age, income, gender, educational level, needs and tastes, etc., that influence their choices of goods and services.

The strategy of information, communication and promotion of organic food products must identify the corporate image of environmental and ecological responsibility, in addition to promoting ecological lifestyles with the emotional component that provides the benefits of taking care of good health and the quality of ecological services It provides the enjoyment and beauty of the environment.

The strategies of ecological communication and green marketing of products and sustainable organic foods also show discrepancies between producers, distributors, and marketers to motivate and influence the decision processes of buyers and consumers. Ecological promotion strategies for organic green food products refer to well-being, health, nature, and the environment because they contain no toxic substances.

The promotional activities strategy that considers advertising and public relations activities of organic food products must present the characteristics, and benefits provided by satisfiers, organic products or ecological services about the nature and the environment.

Local governments do not have or have deficiencies in regulations, policies, and strategies for the development of organic agriculture and agro ecology that have increased due to the growing demand

for organic products in international markets. State institutions must formulate and implement policies and regulatory regulations that support and encourage the efforts of producers and motivate consumers of organic products and ecological services. The agricultural sector of organic food products must be supported by public policies, regulations and strategies that enhance their sustainable development in terms of food safety, health, education, employment, foreign exchange, etc. Urban food strategies and policies are related to the new governance mechanisms that involves civil society (Blay-Palmer *et al.* 2017, FAO 2011; Viljoen & Wiskerke, 2012).

The implementation of public policies and environmental regulations to encourage the sustainable consumption of organic food products and ecological services that motivate and regulate the behavioral processes of decision-making is a priority of government institutions to improve health and food systems of people and care for and preserve nature, the environment, and ecosystems. The lack of functional policies and strategies regarding the production, distribution, and consumption of organic products for the attention and satisfaction of domestic demand will continue to be produced for international markets.

The increase and diversification of organic food products supply is a necessary strategy to strengthen production, distribution, and consumption, as well as supply for the growing demand for vegetables, tropical fruits, cocoa, coffee, etc. Consumers of organic foods are more selective and demanding because they are better informed to choose about satisfiers and make purchasing decisions most efficiently, minimizing time and effort, so that the relation of quality-price variables is decisive. Producers and distributors formulate and implement their strategies according to the assumptions described (Buil Carrasco, Martinez Salinas, & Montaner Gutierrez, 2017).

The regulations and public policies on the production, distribution and consumption of organic products must be guided by growth and economic efficiency, social equality and inclusion, environmental sustainability, but above all to improve people's nutrition, health, and well-being.

CONCLUSION

The dismantling of the industrial agro-food complex has been replaced by the restoration of local agro ecological alternatives that oppose corporate control over production and consumption and support for local producers to create local food systems. The sustainable production and consumption of organic food products is a function of the recovery, care and conservation of natural resources, biodiversity in the ecosystem. There is a growing consumer interest in local organic food grown agro ecologically by farmers with whom consumers can interact.

Urban agro ecology is interested in the production of healthy foods, taking care from the cultivation of the land to the supply and consumption of urban agro ecological foods. Converting land to urban agro ecology leads to community food security and self-sufficiency in any city (Colasanti, 2010) although urban agro ecology farming has limits to supply adequate organic food for the city (Thibert, 2012). Urban agro ecology may be a mean of food production within the city for greater environmental sustainability while the consumption of fresh vegetables and fruits reduces dependence on external resources and imports from rural areas, making them less vulnerable to the food crisis.

Interactions between producers and consumers participating in food networks with channels and learning contents, contribute to learn about agro ecological production and ecology. Agro ecological producers must establish minimum requirements to enter formal markets and be recognized through

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development and capacity building and the development of inclusive and participatory methods to create and guarantee organic products.

The emerging policy of the food system is disconnected from the ethical values of the sustainable environment, access to land, production, distribution, and consumption, incorporating commercialized versions of urban agro ecological practices and avoiding socio-environmental exclusion.

A government's double policy design can encourage and stimulate agro ecological production by offering some fiscal incentives while increasing the price of agro ecological and organic products above the market average without excluding the poor people by providing special access. In this sense, the dual agro ecological policy approach can provide economic support for production while protecting access to food consumption for the most vulnerable people. The beneficiaries of organic food production can be entitling to incentives that may be the land private property owners who get lower taxes and not the disadvantaged communities who experience inequities in food security (Havens & Roman-Alcalá, 2016).

Urban agro ecology can contribute to food security for any household in any city depending on land available, climate and skills of farmers (Grewal & Grewal, 2012). Urban agro ecology cultivation increases food access and food security to all household of participants, practitioners, consumers, and recipients (Algert, Baameur, & Renvall, 2014). Critics argue that urban agro ecology as strategy is limited to increase food security if the consumers lack access to land, physical capacities and skills needed in these activities (Ghose & Pettygrove, 2014). The export costs of agro-ecological products increase creating tensions in production prices for the domestic consumer market and to achieve self-sufficiency with the consequent worsening of living conditions.

Promoting agro ecological food systems requires the agreement and participation of agent's ties to collaborate with the networks of all stakeholders, landowners, farmers, producers, consumers, market organizations, communities, civil society, non-governmental organizations, companies, institutions public, research institutions, universities. etc.

The establishment of localized resilient agro ecological food systems jointly with circular economy production and consumption models in local economies should be promoted by ecological units of local governments.

Urban agro ecology contributes to healthier and more sustainable living conditions of farmers and consumers involved in land-based activities. Urban agro ecology also contributes to better food sovereignty and sustainability based on economic, social, political, and environmental dimensions. To implement an agro ecological food system, the state, social, private actors, and academic and research institutions must be proactive.

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KEY TERMS AND DEFINITIONS

Agro Ecology: It is the discipline that is responsible for managing the ecological principles of the production of food, fuel, fiber, and pharmaceutical products. This encompasses a wide range of approaches, and they consider it a science and a way of looking at life, whether organic, conventional, intensive, or extensive.

Consumption: It is the action of using and/or spending a product, a good or service to meet both primary and secondary human needs.

Organic Food: Are those that do not involve chemical substances in their production process such as pesticides, herbicides, or fertilizers.

Policy: Is an activity oriented ideologically to the decision-making of a group to achieve certain objectives.

Production: The process of manufacturing, elaborating, or obtaining products or services.

Strategy: It is a plan that specifies a series of steps or nuclear concepts that allow the use of available resources and that are aimed at achieving a certain objective.

Sustainable Consumption: Refers to the use of goods and services in a responsible way to minimize the use of natural resources.

Chapter 24

Automated Remote Control of Cheese Ripening Chambers: Increasing Economic Value Added While Reducing the Risk of Transmission During the Pandemic

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ABSTRACT

A new prototype of a ripening chamber was proposed aiming to evaluate the application of computational fluid dynamics in the optimization of traditional cheeses ripening conditions. With the purpose of evaluating the possible impact in the production of cheese in three Portuguese regions, the potential

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economic benefits of the prototype were demonstrated. The proposed automation process would imply higher production efficiency, increasing sales, decreasing stock levels and a significant reduction in the consumption of water and electricity. Based on average values, it was estimated potential increases of 133 010 € in sales and an individual net present value of almost 560 000 €. In addition to the economic impact in firms, which are mostly small and medium firms, the results also contribute to an increase on the sustainable use of natural resources. However, it is important to highlight the contribution of the project in a pandemic situation to develop a better financial situation of the firms based on a higher margin of the business.

INTRODUCTION

Traditional dairy industry, based on small ruminants sector, is very relevant in the Alentejo region, with an important impact on the specialization and employment profile of the region. It has been stated that livestock rearing conditions, namely diet composition and extensive systems, the raw milk, as well as the manufacturing process and the ripening conditions contribute to the chemical and sensorial characteristics of the cheeses, being responsible for such unique specificity, influencing the buying decision and appreciation of consumers (Rodrigues et al., 2018). Portugal is recognized as a country where traditional economic activities related to agriculture remain important, not only because they are relevant in rural areas but also because it is possible to find several products with recognized quality, with traditional cheeses being one of the examples. Of the different types of cheese available, made with ewe, cow, goat or mixed milk, the firmness, organoleptic properties and composition, among other characteristics, vary depending on the region of production (Fox & McSweeney, 2017). The improvement of the production conditions of a given activity is crucial both at the microeconomic level, enhancing the results of the individual firms, but also at a macroeconomic level, potentiating the economic development of the region. The importance of maintaining investments in the economic activities is well documented and is clear for several activities, including investments in traditional manufacturing firms in general (Nybakk & Jenssen, 2012), but also in the specific case of the dairy industry (Aziz et al., 2019; Ragkos et al., 2015). As expected, the investments in this sector, in particular, have an important relevance on the productivity (Barać & Muminović, 2013; Sauer & Latacz-Lohmann, 2015) and consequently on the economy as a whole. The investment decisions in the dairy sector could also have relevant impacts on environmental issues, which could contribute for the achievement of the objectives of sustainable development (González-García et al., 2013; Valta et al., 2017).

In the last decades, the traditional ripening rooms, using empirical knowledge for the control of environmental conditions, have been replaced by modern ripening chambers with automatic control of temperature and humidity. However, the use of refrigeration systems based on the vapor compression cycle are largely responsible for the high energetic costs, that in some enterprises may reach 60% of the total energetic costs (Alves et al., 2014). Within the scope of the “CFD4CHEESE – Application of computational fluid dynamics in the optimization of traditional cheeses ripening conditions” project, new insights were used to improve the environmental conditions in small ripening chambers using computational fluid dynamics but also using remote monitoring and sensing to evaluate operational costs like energy and water consumption. With these improvements it is expected to increase the quality and the efficiency of the cheese produced with raw ewe’s milk and thus increase the quantity of cheese granted with Protected Designation of Origin (PDO). The efficiency of the production process is also fundamental

for the profitability of the activity, since it allows the optimization of the use of the raw materials and the increase in the quantities of final product available to the market. It is hence possible to optimize the relationship between inputs and outputs of the activity, being this one of the major concerns of the project. The eventual PDO cheese production is important because it guarantees producers to have higher economic results in terms of firms (Sellers-Rubio & Más-Ruiz, 2015) but also in a macroeconomic level (Vakoufaris, 2010). These new conditions of the businesses, turn the firms less dependent of economic cycles and more robust to the volatility of the demand in a time of a pandemic situation.

In order to continue to preserve the characteristics of traditional cheeses, different geographic production areas were created in Portugal, in a total of thirteen PDOs and one Protected Geographical Indication including “Queijo de Azeitão” (Azeitão cheese), “Queijo de Évora” (Évora cheese) and “Queijo Serpa” (Serpa cheese), which are under analysis in this paper. In 2015 it was estimated that the cheese sector represented about 25% of the dairy sector in general, with a sales volume of about 1.800M € (Roteiros e eventos, n.d.). However, the trade balance (in the cheese category) is quite unbalanced, with a deficit of about 30% in terms of the national production (Roteiros e eventos, n.d.). Nevertheless, this deficit has been reduced in recent years, since the national industry has made great efforts to strengthen its external competitiveness, through the promotion of its brands and through the adaptation to the requirements of the various destination markets. However, some barriers to the export of Portuguese’s high-quality cheeses persist, as they are obtained from raw milk and, mainly soft cheeses, need care such as maintenance external appearance of the cheese and control the development of molds.

Although prices still remain an important variable, adding some value to the supplies products such as obtaining the PDO label, allows selling to more demanding customer segments in terms of the quality of the final product and less sensitive to the price. In general, cheeses with PDO could have an increase of the price of about 23% compared to the non-PDO ones, allowing these companies have a higher margin to cover their activity expenses (Cabo et al., 2017).

According to the last available data on the database of Central de Balanços do Banco de Portugal, Portugal had a total of 249 firms in the dairy industry corresponding to a total of 5710 employers and about 1.4 billion euros. This is a highly concentrated sector with 20% of the firms having almost 96% of the sales. Sales were decreasing from 2013 to 2016 with a slight increase in 2017. The cost of raw materials, mainly milk, is the most important factor (about 69% of the total) followed by external services (including water and electricity) and human resources.

Despite of the importance of national results, for this study the information about the firms devoted to the production of cheese in the regions under analysis is more relevant. Considering the elements identified in the methodological section, a total of 46 firms were identified with the available data, with a total of 22 firms which could produce cheese of Évora, 16 of Serpa and 8 of Azeitão regions, most of them with more than 10 years in the market. From the economic analysis it was possible to find the results for a total of 31 firms, considering only the ones which presented results from 2015 to 2018. The results are consistent with the general findings of the dairy sector, with an increase of sales and profits in the final of the sample and with the predominance of the cost with raw materials in the cost structure of the firms, although a lower percentage (about 55%), with a higher share, in this case, for the external services (about 31%). Despite the apparently good financial results, the gross added value is much lower in 2018 than in 2015, which could mean some difficulty of the firms to be competitive and with some incapacity of differentiate themselves from the competitors in general.

The above-mentioned project itself is important as identifies the structure of a new ripening chamber to be used in the traditional cheese manufacturing. Considering those objectives, this work fills the

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existing gap in the literature because it identifies the economic relevance of the application of those ripening chambers in the real economy. The aim of this work was to analyze the potential benefits and the potential costs of the new prototype, quantifying them and studying directly the economic viability of the prototype. Moreover, and for the particular case of the consumption of electricity and water, was studied the hypothesis of the reduction on such resources. Our main results show that the investment needed for the automation in the ripening chambers is viable once it creates enough cash flow in several items such as energy costs, increase of sales and stock divestments, contributing to a better financial sustainability of the firms in these difficult times of covid-19 pandemic.

Material and Methods

A questionnaire was applied to cheese producers using raw ewe's milk inside the regions of Azeitão, Évora and Serpa cheeses. The questionnaire was built for data retrieval, with direct interviews with the managers, organized into four categories: 1) Identification; 2) Cheese production; 3) Ripening conditions, and 4) Social and economic characterization. In total, 28 firms were interviewed, from the different PDO regions, respectively 4 producers of Azeitão, 9 from Évora and 15 from Serpa cheese regions. The selection of the participating companies was random, based solely on the operating income of the last available year, namely between Q1 and Q3, and represented around 60% of the total firms inside the study region. The interviews were conducted personally by the researchers involved in the project. The firms were identified in the SABI database (Sistema de Análise de Balanços Ibéricos) which allowed us to identify the firms dedicated to the production of cheese in the region. From that database, accounting data was retrieved from the firms and used to perform an analysis of the possible economic impact of the newly proposed ripening chamber. This information is then compared with the results of the prototype, to identify the advantages of its use.

Using the questionnaire, the main characteristics of the firms in the regions under analysis could be identified. Most of the firms are micro or small firms, with familiar structure and mostly oriented to local or regional markets, employing a reduced number of workers (about 92% have less than 10 workers). Most of the firms report that the electricity costs are very relevant, with about 32% identifying costs over 1.000€ per month with water having also a relevant weight (about 300€ per month). Regarding the produced cheese, about 1/3 of the firms produce with PDO label arguing that the costs of the certification process are high, associated with the needed bureaucracy.

The ripening process of the cheeses occurs in specialized chambers, which work under idealized conditions of temperature, humidity or ventilation, depending on the type of cheese. During the ripening process, biochemical changes occur mainly due to microbiological activity, leading to the development of the differential characteristics of such cheeses in terms of texture, flavor and aroma (Alvarenga et al., 2011; O'Sullivan & Cotter, 2017). In fact, temperature and humidity are crucial conditions in the process in order to have good production results.

Construction of a Prototype of Improved Ripening Room

A prototype of an improved cheese ripening room was developed, based on traditional ripening rooms inside study region. The distribution of temperature, humidity and air velocity was optimized through a set of simulations based on Computational Fluid Dynamics (CFD), aiming for the environmental

Figure 1. 3D model of prototype

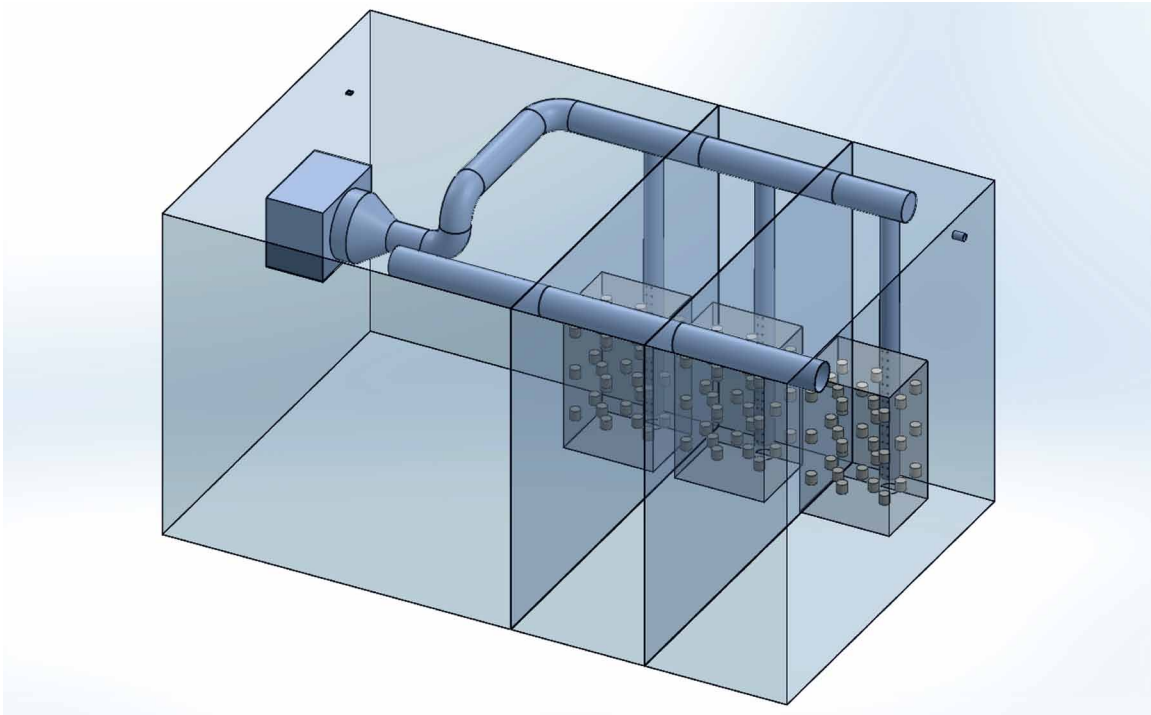
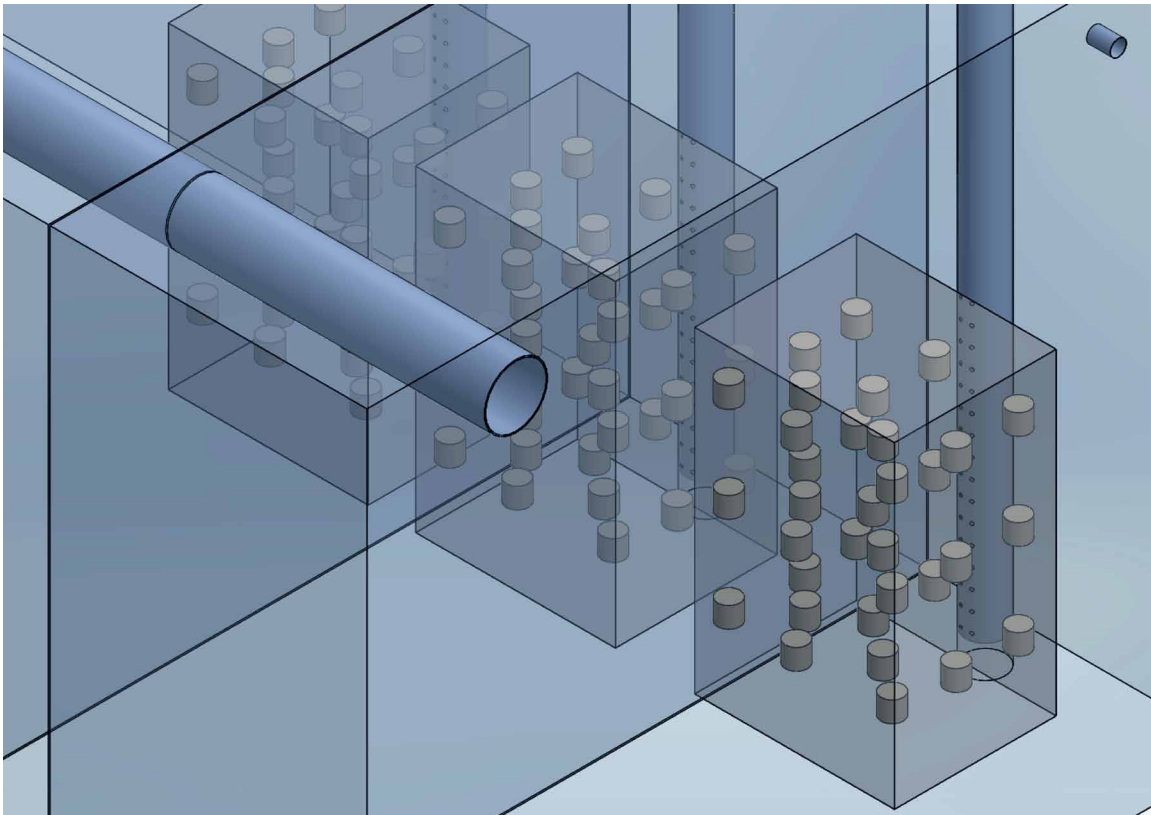


Figure 2. Control volume of cheese stacks



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conditions which made possible the highest quality on cheese (Figure 1), including physicochemical, microbiological and sensorial parameters (data not shown).

The CFD numerical simulations were performed on software Fluent 19.3 (Ansys, USA), running in a computer CPU Xeon E3-1241 3.50GHz, RAM 16GB DDR3 1600MHz, GPU NVIDIA Quadro K2200 4GB. For the computation, a hybrid mesh type was considered (i.e., including hexahedral and tetrahedral elements) and constructed using software Ansys Meshing. A hexahedral mesh was considered for the volume inside stacks, while a tetrahedral mesh was considered for the remaining volume of ripening room. For the simulations, airflow was considered steady, incompressible and turbulent. The evaluation of the sensitivity of the model to turbulence was done comparing $k-\epsilon$ model, $k-\omega$ model and using a first and a second-order upwind. However, preliminary tests showed that $k-\epsilon$ model, in combination with the first-order upwind differencing scheme, presented the highest correlation to the experimental data. The convergence residues for simulations was 0.001, concerning continuity, turbulent kinetic energy (k), energy dissipation (ϵ) and velocity of the x , y and z vector components. Computation time was about 150 h (average) depending on the specific simulation.

After the optimization of the geometry using simulations, a physical prototype of the ripening room was built (276 width x 436 length x 232cm height) using expanded polyurethane thermal insulation panel as walls and ceiling. The top view of the prototype is represented in Figure 3 and the side view is represented in Figure 4. The prototype was equipped with a vapor compression refrigeration system (Eurofred, FAM040Z002, Spain), using refrigerant fluid R-404A, and a humidifier (Nordmann Engineering, DC4, Switzerland). Air inlet was located at the ceiling of the room (Figure 4), then air was conducted through the evaporator for proper refrigeration and into a 200mmØ PVC duct. Finally, three pneumatic butterfly valves (Trox Technik, B555DC2, Germany) regulated the admission of refrigerated air into three different zones inside the ripening room, separated by insulating material. Air outlet was located in the front wall, regulated by an 180mmØ fan (Figure 3).

Figure 3. Top view

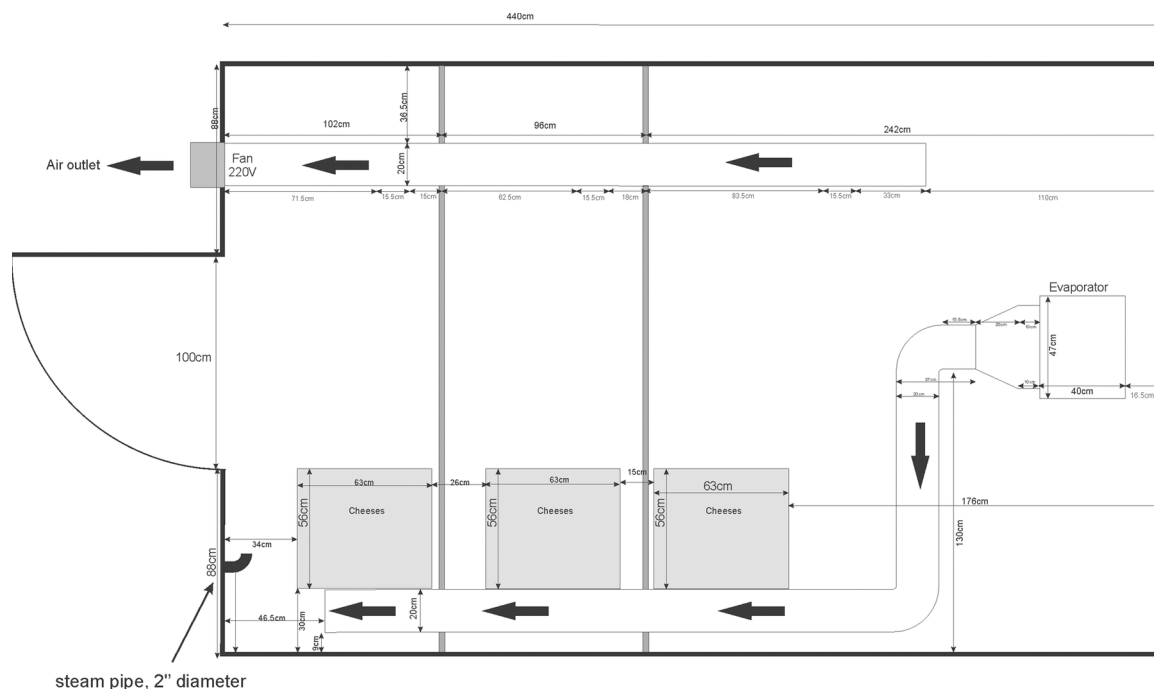
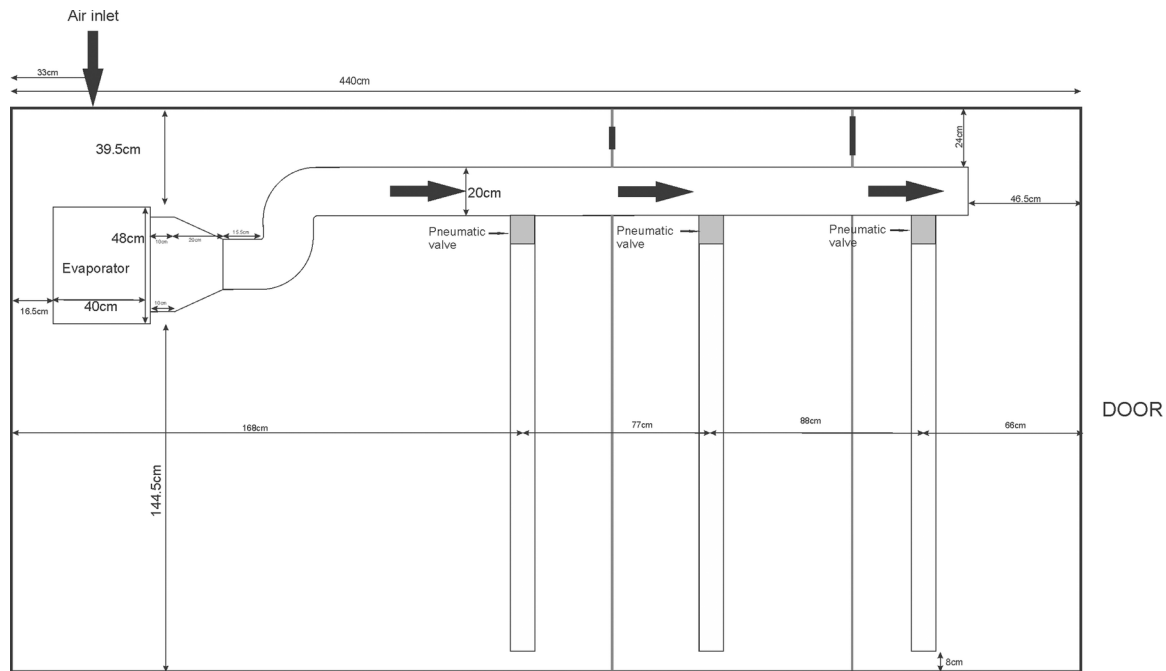


Figure 4. Side view



The architectural paradigm of designing systems based on sensors, microcontrollers and microcomputers of low-power and with an Internet connection, called “Internet of Things” (IoT) was adopted for the design and implementation of the prototype for the data acquisition and control system. The parameters considered in the monitoring of cheese ripening included the measurement of temperature, relative humidity (sensor DHT22/AM2302), and air velocity (F660, DegreeC) in three locations inside the ripening room. The consumption of electricity by the compressor, humidifier, and ventilation, was evaluated using current transformers (SCT-013, YHDC). The consumption of water by the humidification system was measured using a flow-rate sensor (YF-S201, Uruk) in the inlet water pipe of the humidifier. The monitoring and control system included two main modules: the monitoring module and the control module (Figure 5). The monitoring module was intended for the collection of data related to physical-chemical parameters, while the control module was responsible for the proper adjustments on temperature, humidity and air extraction by activating the refrigerator, humidifier and the fan extractor.

The monitoring module was based on a WiPy computational platform (“WiPy 3.0 - Pycom”, 2020), based on the ESP32 microcontroller that contains an Xtensa LX6 microprocessor (Tensilica) with a 32-bit CPU architecture. It is characterized by its low-power consumption, reliability and electrical strength for use in industrial environments or thermally less favorable. The input and output ports of this microcontroller were particularly suitable for connection to communication systems and data collection. In this case it features a Wi-Fi communication module that can be used for wireless transmission of data collected from the sensors, placed inside the cheese ripening chamber, to the aggregator module that is outside. The individual acquisition modules were associated with fixed local Internet addresses, assigned by the aggregator module so that they can be accessed remotely at any time for the purpose of monitoring their operating status or for updating their data acquisition software.

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Figure 5. System block diagram of data acquisition and instrumentation apparatus

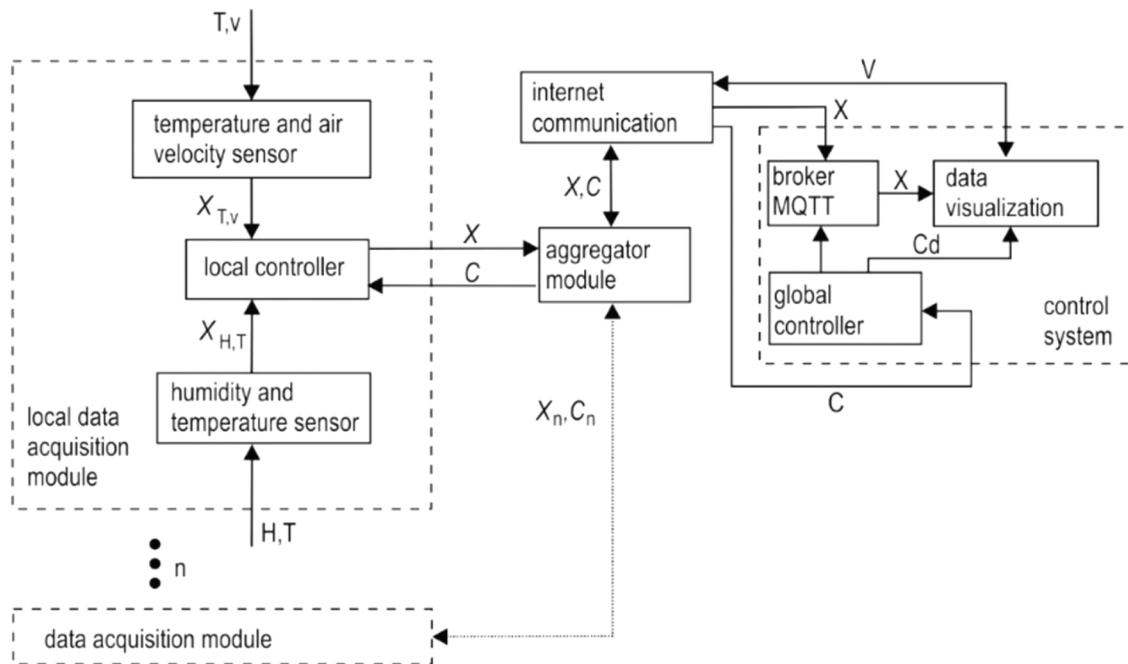


Figure 6. Placement of a monitoring system in a ripening room



This computational platform supports development with an interpreter version of the Python programming language called MicroPython (“MicroPython - Python for microcontrollers”, 2020) which facilitates the development of applications by providing several libraries to access the various subsystems of the WiPy platform. The aggregator module was built with the computational platform Raspberry Pi 3B +, receiving the information from the data acquisition modules, storing such data locally but also transmitting through the communications subsystem, via Internet connection to a remote server. The Internet protocol used to transmit this data was MQTT, based on the message subscription model. The MQTT server was installed on a computer managed at IPBeja’s SEPSI (Electronic Systems, Signal Processing and Instrumentation Laboratory) laboratory and using RabbitMQ software (“Messaging that just works - RabbitMQ”, 2020) on an Arch Linux operating system (“Arch Linux”, 2020). The data is collected using a program created through the Node-RED low-code visual programming platform for treatment, visualization and storage in a database (“Node-RED”, 2020). This platform is especially used in systems based on IoT. The control system is also connected to the Node-RED server and receives the values of the readings made by the data acquisition systems.

Through SSH (Secure Shell) connection in reverse mode was possible to remotely access aggregator module and, thus, communicate with the local data acquisition modules. SSH connections were encrypted and the Internet addresses of each of these local modules were assigned by means of a DHCP server to be executed in this aggregator module. For the realization of the operation tests, the conditions presented in Table 1 were adopted.

Table 1. Environmental conditions inside prototype

	Pre-project	Post-project
Temperature	11.9°C	13.5°C
Humidity	83.2%	84.0%

Concerning investment cost, building the whole automation system of an already existent ripening chamber costs about 6.605€ (plus taxes): 4.000€ for the automation equipment, 2.000€ for tubes and accessories, and 605€ for hand labor for assembling and programming the system. These costs were based on the actual market prices. When performing the analysis, such amount, around 6.605€ and corresponding to the difference between the existence, or not, of automation in the system, must be considered due to its relevance in this study. This is one of the inputs of the analysis of economic viability of the new prototype. For this analysis, the average results of firms of the sector was considered as the reference, showing that this process ensures an increase of the competitiveness of SME’s in the sector but also could have a high impact on the sector as whole. Moreover, the reduction of consumption of resources like water and electricity, apart from implying a reduction in costs, are also relevant for the environment, helping to attain higher sustainability levels.

RESULTS

The results of the query applied in the study region indicate that traditional cheese factories are mainly individual or family-owned companies and the owners are, on average, approximately 59 years old. About 92% of such companies present less than 10 workers (Figure 7)

Excepting a few specific cases in each region, the ripening rooms present small areas, between 22 and 46m² per room (Table 2).

During ripening, some care is necessary in order to ensure the final quality of the product, like the proper evolution of water loss or microbiological development. In most cases cheesemakers turn cheese everyday, however, in certain cases this operation was done every two days, weekly or even fortnightly (Figure 8).

The operation of washing the surface of cheeses aims to improve the external appearance of the cheese and control the development of molds. However, if it is important to perform this task, on the other hand, over-washing increases the risk of breakage for the cheese rind, especially in cheeses with buttery texture. The results show that the number of washings per ripening cycle was about 3 in the region of the Évora cheese and about 2.5 in the regions of Azeitão and Serpa cheeses.

Figure 7. Workers per cheese factory

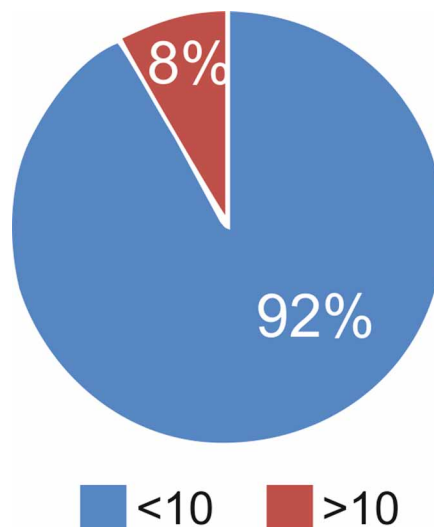


Table 2. Dimension of ripening chambers

	First ripening chamber				Second ripening chamber		
	Lenght (m)	Width (m)	Height (m)		Lenght (m)	Width (m)	Height (m)
Azeitão	4.7	6.3	3.2		4.7	6.0	3.2
Évora	5.2	4.3	3.2		8.1	5.7	3.2
Serpa	5.5	6.0	3.0		5.1	5.8	3.0

Figure 8. Turning cheeses

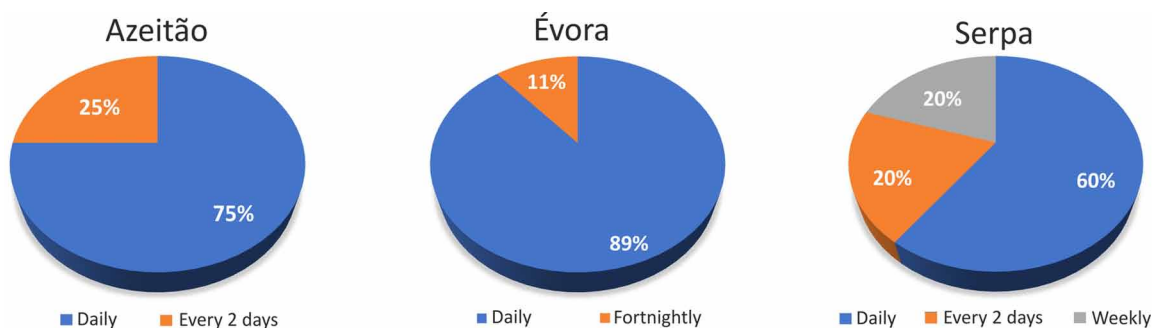
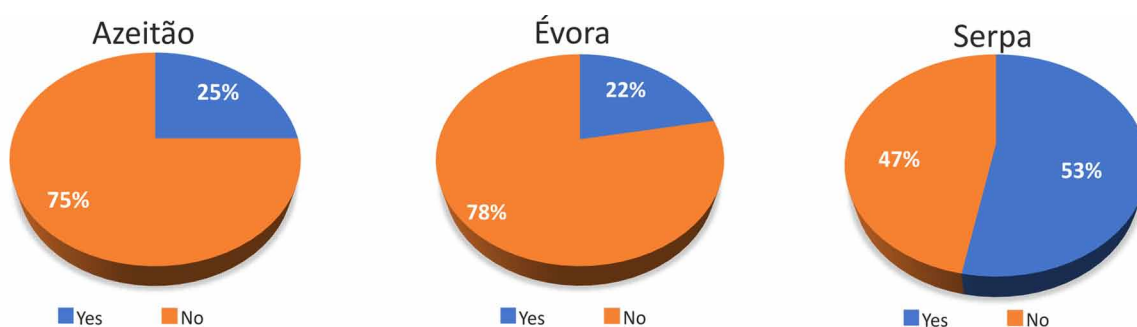


Figure 9. Is the ripening homogeneous inside the ripening chamber?



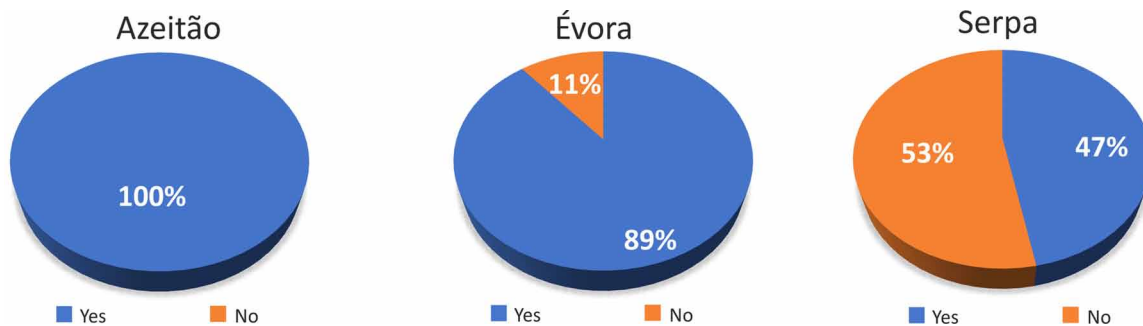
Regarding the homogeneity of the ripening conditions, in the regions of Azeitão and Évora it was found that in the vast majority (above 75%), the ripening of the cheeses inside the chambers was not homogeneous. In contrast, in the Serpa cheese region, only 47% stated that it was not homogeneous. Thus, it is possible to conclude that this is a fundamental aspect to take into account in the near future, in order to increase the homogeneity of the ripening conditions to improve the characteristics of the cheese during the ripening period and, consequently, its commercial value (Figure 9).

As a result of this lack of homogeneity inside the chambers, it is necessary to constantly change the location of the cheeses in order to avoid their constant stay in too dry or too moist environments. As can be seen from Figure 10, the percentage of cheese makers where this practice was observed is consistent with the responses represented in Figure 9, thus verifying a cause-effect relationship. The immediate consequence of this need to change the location of the cheeses is, without a doubt, the greatest burden in terms of labor, since it is usual to spend no less than two hours a day.

As presented in figures 7 to 10, the results of CFD4CHEESE project were especially relevant in a pandemic crisis context. In order to obtain high quality products in the artisanal industries, especially when using raw milk, a daily handling is required, whether to change locations, due to heterogeneity in the environmental conditions in different locations, either by the need of turning cheeses daily to maximize homogeneous ripening and rind aspect. In the other hand, a daily wash of the rind of cheese is necessary to improve the appearance and prevent defects caused by moulds. On the other hand, is a common practice to perform the washing operations in teams and inside small openings near the ripening

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Figure 10. Is it necessary to change the location of cheeses during ripening time?



rooms, for a better convenience. The energetic efficiency of the ripening chambers is directly related to the volume inside and is one of the reasons for not oversizing. For such reasons, is not easy to ensure the distance between workers required by the COVID 19 security rules and, the results of CFD4CHEESE project may have these added motivations because it aims to model environmental conditions in order to minimize handling needs on the process.

This section will identify a set of important economic variables about the prototype, namely the respective production and operational costs. After that, some potential benefits will be identified and, based on some assumptions, the potential economic impact of the project in the regions under analysis will be presented. It is noteworthy that all the values considered were based on the economic and financial values available in the central balance sheet of Banco de Portugal, as well as the various financial reports of the companies that constituted the sample.

From the different essays, it was possible to find several important impacts in the consumption of electricity and water, associated to the normal operation of the prototype. The consumption of water was estimated based on the instant flowrate (in ml/s), recorded by the aggregator module, multiplied by time (s). The consumption of energy was estimated based on the electric voltage, number of phases and instant current value (A), recorded by the aggregator module, multiplied by time (s) The results are described in Table 3 and allow us to conclude that the savings considering the operation of the prototype

Table 3. Consumptions of the system with and without automation

	Electricity		Water
	Refrigeration compressor (kWh)	Humidificator (kWh)	Humidificator (liters)
Conventional ripening chamber			
Average	11.85	8.71	11.66
KS normality test	0.360**	0.190	0.200
Automated ripening chamber			
Average	6.96	3.90	8.58
KS normality test	0.174*	0.093	0.112
H0: Conventional = Automated	-2.754***	4.075***	5.424***

the values correspond to the average levels of the essays). KS normality test refers to the statistical test of Kolmogorov-Smirnov. ***, ** and * denote, respectively, significance at 1%, 5% and 10% levels.

are about 26.44% in water and about 47.21% in electricity. Moreover, some statistical test were developed to confirm the statistical significance of the differences. For the conventional ripening chamber, data during 8 days was retrieved and during 23 days for the automated ripening chamber. After the analysis of the normality of the variables, the null hypothesis for the averages of the electric consumption of the compressor was rejected, while the averages of the consumptions of the humidifier (both for water and electricity) revealed normal data. The analysis of the equality of the variables was considered. In the case of the non-normal data Mann-Whitney test for the equality of the medians was used, while in the case of normal data was used the t-test for the equality of means.

It is important to note that the savings identified in Table 3 do not correspond to the total of savings in the costs with those two important external services. In fact, 47% of the saving in the electricity corresponds to the reduction of the consumption of the prototype and not the total of the firm. The whole essay had a duration of 21705 minutes, during which the compressor worked for 4263, implying that it about 19.6% of the time, which means a potential energetic gain of 9.21% for the firms. Nevertheless, a 9.21% reduction was considered as a significant value.

Regarding water saving, the prototype considers a reduction of about 26% of its consumption. The final impact is more reduced, not only due to the cost of this resource, but also because the amount of water used in the chambers is residual when compared with the total amount of water used in the whole firm, since most part of the water, according to the managers, is used in the washing of the cheeses and the in the clothing used in the firms. But considering that water is a crucial resource for human beings, even more so in the regions where the study was conducted, often suffering from weather droughts, all the savings are relevant to pursue to objectives of attaining sustainable development, even if the monetary costs are less relevant.

Even with the reduction of costs with the prototype, it is also important to evaluate the potential benefits of that equipment. On one hand, it is expected that firms could increase their sales, once they produce more cheese with higher quality using the same raw materials. This happens because the prototype allows for higher efficiency levels in the production, increasing the quality of the cheeses which contributes for a higher quantity of final available product. During the realization of the questionnaires, firms answered that in average, and per day, with the traditional chambers they had about 15 kg of defective cheeses, with the respective impacts in sales. As the prototype has a direct impact in the ripening conditions of the cheeses, it will enhance the quantity of final product and the necessary quality for the introduction in the market, optimizing the relationship between the inputs of the activity and the generated outputs. On the other hand, and as firms have higher quantities for sale, it could contribute for a higher financial sustainability which would allow business to be more solid and possibly to gain the necessary conditions to obtain the PDO valorization of their products, increasing the margins, since firms could practice higher prices.

Another possible relevant issue is the stock reduction promoted by the prototype. As referred, it is usual for firms to report cheeses which do not have the desired characteristics to be sold, implying that they have to remain stored for longer periods, losing water and being sold as old cheeses. This has an impact on the activity since these cheeses lose weight, implying less quantities are sold with a relevant reduction of revenue. With the prototype, it is expected that the quality of the cheeses will be optimized and thus minimize the quantity of stocks and of cheeses sold in these conditions.

Previous identified elements were considered in the economic analysis of the new prototype, considering the possibility of its introduction in each cheese producing firm in the regions under analysis.

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Knowing the average added value per company, an extrapolation can be made to a macroeconomic level production sector. Some other assumptions were considered for the analysis.

Firstly, and as previously identified, and considering the increase of the efficiency in the production of cheeses, allowing for the increase of production, a potential growth of 15% in the quantities of kilograms of finished product available was considered to introduce immediately in the market. This percentage is based on the opinion of the producers, being an assumption taken in this study. Because it is not an estimate, during the analysis different scenarios were considered, allowing for a lower level of this increase in sales.

As direct consequence of this increase of sales the firms will reduce to a residual basis the quantity of cheese in stock and, regarding the price, a potential increase in market price around 10% can be considered, due to the possibility of PDO label production. Note that according to (Cabo et al., 2017), the PDO qualification could contribute to an increase of the prices up to 23%, which means that a conservative assumption was taken. The reduction in the cost of the electricity was of about 9%, as previously explained.

The reference values for the average monthly sales were established using the data obtained in the surveys conducted within the scope of the project. Considering the reports of the firms of the three regions, can be considered an average amount of sales of 3425 kg per month and an average price of 12.21€ per kg resulting on an average annual turnover of 501 920€. The reference annual electricity value was obtained through the average amount of electricity spent by the companies studied, which was about 2.3% of the sales volume over the years 2017 and 2018. This means an annual reference value of 11 544€, corresponding the 9% of savings to a decrease in this cost item of 1 038.97€. The eventual PDO production has associated costs and, in this sense, a value of 5 000€ was considered. For this assumption, was considered as reference similar costs for cheese producing companies of *Serra da Estrela* PDO cheese, which amounts to an annual cost of about 4 500€.

As previously referred, a relevant impact is considered on the stock of final products in the firms, once the productive efficiency increases with the prototype. For the economic analysis, a 80% reduction in the level of finished product stocks was considered, even if it is expected that with the implementation of the new ripening chambers, the number of cheeses involved in aging processes will be very residual. The reference value for stocks of finished products was based on its weight in relation to the turnover in the companies studied over the years 2017 and 2018, namely 9%, implying a monetary value of 45 172.72€.

An income tax for firms of 21% was considered, which is the actual tax rate in Portugal and a depreciation rate of 25%, a period of 4 years as the one to determine the potential economic value to be created with the investment was considered. The necessity of installing the automation system in two chambers was assumed, since it is the most common number of chambers in the studied firms. It is considered that the investment is made at the beginning of 2021 implying that firms take advantage of the increase of sales all over the year.

Finally, in order to determine the Net Present Value (NPV) of the project, a discount rate of 6% was considered, based on the average return rate on the assets of studied companies. It is intended, therefore, to ensure that the implementation of the ripening chambers provides investors with, at least, the same remuneration that most companies operating in the industry currently create.

Table 4 identifies, briefly, the assumptions used to study the economic viability of the implementation of the new ripening chambers.

Table 4. Assumptions used in the study of the economic viability of the implementation of the new ripening chambers

Assumption	Value
Beginning year for the prevision	2021
Annual sales volume of reference	501 919.15€
Monthly production (kg)	3 424.67
Price per kg	12.21 €
Increase of production quantity (%)	15%
Increase of price (%)	10%
Annual electricity savings	1 038.97€
Annual reference cost	11 544.14€
Energy saving (%)	9%
Annual cost with PDO certification	5 000€
Annual value of stock reduction	36 138.18€
Annual stocks of finished products (reference)	45 172.72€
Reduction of stocks (%)	80%
Investment in automation of the ripening chamber	6 605€
Number of chambers	2
Depreciation rate	25%
Income tax rate	21%

The cash flows of the project, used to calculate the NPV, are the ones presented in Table 5. More details about the calculation of the NPV could be found, for example, in (Ross et al., 2017). Considering the discount rate, and that the investment is made immediately at the beginning of 2021, the NPV is equal to 559 923.73€, meaning that, on average, the project has the potential to release funds over the useful life of the ripening chambers, showing the capacity to cover initial investments and to generate return to investors, considering an annual remuneration of 6%.

Although the assumptions taken in account in this study are the ones obtained in the questionnaires and from the databases, they are still only estimations. Considering the level of uncertainty, sensitivity analysis was implemented, considering possible variations on some assumptions, namely the following three scenarios: i) firms to not attain the PDO certification, not considering neither the increase of 10% on sales price increase nor the annual certification costs; ii) despite the non-consideration of PDO certification, to consider an increase of just 10% of the sales (while in the reference scenario it was considered an increase of 15%); iii) maintaining the absence of PDO certification, considering now an increase in sales of 20%. In this way, it is intended to verify the robustness of the project to the uncertainty always associated with economic and financial forecasts, verifying the impact on the project of variations in some fundamental variables of this business.

Table 6 summarizes the main results of each of the three scenarios, compared with the reference one. In the scenarios 1-3 the NPV value is lower than in the reference scenario, but the NPV is always positive. In fact, the investment needed to automatize the ripening chambers is fully overcome not only by the increase of the sales but also for the stock divestment. Thus, it appears that the ripening imple-

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mentation project is economically viable and may contribute to greater financial sustainability for cheese production companies.

Table 5. Cash flows of the project

Item	2021	2022	2023	2024
Investment	13 210.00 €			
Stock divestment	-36 138.18 €	-36 138.18 €	-36 138.18 €	-36 138.18 €
Sales increase	133 008.57 €	133 008.57 €	133 008.57 €	133 008.57 €
Reduction of electricity	1 038.97 €	1 038.97 €	1 038.97 €	1 038.97 €
Costs with PDO certification	5 000.00 €	5 000.00 €	5 000.00 €	5 000.00 €
Depreciations	3 302.50 €	3 302.50 €	3 302.50 €	3 302.50 €
Increase of annual profits	125 745.05 €	125 745.05 €	125 745.05 €	125 745.05 €
Investment cash flow	-22 928.18 €	-36 138.18 €	-36 138.18 €	-36 138.18 €
Operational cash flow	129 047.55 €	129 047.55 €	129 047.55 €	129 047.55 €
Total cash flow	151 975.73 €	165 185.73 €	165 185.73 €	165 185.73 €

Table 6. Summary of results for the difference scenarios

Indicator	Reference scenario	Scenario 1	Scenario 2	Scenario 3
Annual sales increase	133 008.57 €	75 287.87 €	50 191.91 €	100 383.83 €
Annual profit increase	125 745.05 €	73 024.34 €	47 928.39 €	121 048.48 €
NPV	559 923.73 €	377 240.90 €	290 280.79 €	464 201.05 €

CONCLUDING REMARKS

In this paper, the main goal was to show the economic viability of the investment in the automation of ripening chambers in firms. This automation has the main objective of increasing the productive efficiency of firms, in three different PDO regions in south Portugal and in the firms producing each of the three cheese types under study, in a universe of less than 50 firms. Based on the answers of questionnaires obtained directly in the firms and on the retrieval of data from a database, the average characteristics of the firms could be identified.

For this objective, a ripening chamber was built and several essays were made, which allowed to conclude that the production increased its efficiency, increasing the quantities of products available for sale and reducing the level of investment in cheese stocks. At the same time, it was also verified, through tests related to the operation of the developed prototypes, that the new ripening chambers contribute to a reduction in energy consumption in the ripening process of more than 40%, meaning a saving in electricity costs of about 9%. Regarding the consumption of water, the savings reach levels of about 26%. All of these impacts are very relevant to create a better financial sustainability in pandemic situation.

In order to better demonstrate the impact of the implementation of the ripening chambers in this activity, an economic assessment study was carried out for the cheese production companies, concluding that the investment is viable, with the potential average increase of sales in individual firms of about 133 008.57 €. Considering the total of 46 firms in the regions under analysis, dedicated to the production of the three different cheeses, it could imply a total increase in the sector of more than 6 million euros. Regarding the NPV, based on the average firm it was estimated on 559 923.73 €, which could reach to an amount of about 27.4 million euros for the whole sector. Results clearly show that the investment needed for the automation in the ripening chambers creates value for the firms and for the society as a whole, being an economically viable investment.

In conclusion, it appears that the ripening chamber implementation project is economically viable and may contribute to a greater financial sustainability for cheese production companies, increasing not only the competitiveness of the firms individually (most of them SME), but also the sector as a whole. This is crucial information for managers and potential investors, but also for the economic authorities which could have in this kind of traditional sectors a good basis for enhancement of the economic development of their regions.

Moreover, the results also show that the project could promote not only an increase in the economic indicators but also help in the increase of sustainable use of some resources like electricity and water, also contributing to the environmental sustainability.

At this point, it is relevant to identify some limitations of this study. Firstly, the analysis is made for a reduced number of firms, because the study is related with the above mentioned project, which was limited to the analysis of cheeses in three different regions. Nevertheless, the results are promising regarding to the economic potential of the prototype. Other possible limitation is the fact that some of the assumptions should be confirmed in the future, namely the ones related with the increase of the sales. Although, in this case different scenarios for the sensitivity analyses were considered, with the results showing some robustness.

In the future, a multidisciplinary study should be performed to evaluate the impact on the physico-chemical, microbiological and sensorial properties of ewe's cheese ripened in the prototype, comparing with the standard ripening chambers inside the regions under study. Moreover, the distribution of air inside the prototype should also be studied, using the computational fluid dynamics, in order to homogenize the environmental conditions like temperature, humidity and air velocity, minimizing the operational costs and continuing to improve the competitiveness of the businesses.

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Chapter 25

The Impact of COVID-19 and the Role of Higher Education in Making a Sustainable Recovery

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ABSTRACT

The purpose of this chapter is to explore the implications of COVID-19 to higher education and how universities and colleges can play a critical role in helping shape new ways for the world by adopting environmental sustainability as its academic mission. The effects of the pandemic have reached such proportions that the world may never be the same again. Even though educational institutions have been affected at different levels, there are some measures that can be undertaken to mitigate its impacts. The findings indicate the need for the integration of higher education for sustainable development. This study provides a unique and timely commentary about how coronavirus has altered in positive and negative ways higher education. It suggests that, due to its areas of influence, COVID-19 may also jeopardise the implementation of the sustainable development goals. It sends a cautious warning about the need to continue to put an emphasis on education for sustainable development, so that progress achieved to date is not endangered.

INTRODUCTION

The unexpected arrival of coronavirus or Covid-19 took the world by surprise. It quickly spread all across the world and impacted all areas of teaching and research. Centre for Disease Control and Prevention (CDC) describes Covid-19 as an illness caused by a virus that spreads through discharge from the nose or saliva droplets (World Health Organisation (WHO), 2020). People who are infected may experience respiratory illness while there are others who remain asymptomatic (WHO, 2020). The previous coronaviruses were largely contained to specific regions such as MIERS in the Middle east and SARS in North Asia while Covid-19 quickly spread worldwide. Consequently, Covid-19 has impacted all sectors severely, including the higher education sector. It affected all areas of education including teaching,

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service, and research. Countries closed borders and regions were shutdown forcing Higher education institutions (HEIs) to move their teaching and activities to an online format (Liguori and Winkler, 2020).

As the virus is a new one it is deadly, as a cure is yet to be developed. Poor emergency responses were seen with infected people and death rates on the rise, prompting the World Health Organisation to declare Covid-19 as a pandemic (Ducharme, 2020). The virus is highly infectious, and patients experience pneumonia, pulmonary edema, organ failure and even death. The first countries to report cases of Covid-19 were South Korea, Japan, and Thailand. By March 2020, the number of global cases were over 100,000 in 114 countries (Chen et al., 2020).

Evidence demonstrated that most of the diseases such as AIDS, SARS, Ebola, and the new coronavirus are the consequence of human activity on natural ecosystems. It is time for people to recognise the link between healthy planet and healthy people. This means that at present is the time to make the achievement of sustainability a priority (UN News, 2020). Overall, the pandemic has caused severe economic effects in countries all over the world characterised by a reduction in the GDP and disruption to the education sector, hospitality and tourism, arts, and entertainment to name a few. The high level of unemployment caused by Covid-19 continues to negatively impact economies, especially in the developing world.

The pandemic has changed the way we are living and working. We are at a stage where we need to provide solutions to the issues and problems facing us today and build resilience and adaptability. As the global education system is currently adapting to new challenges and transforming in the light of the pandemic, conventional teaching and learning practices are being put to the test (Cuaton, 2020). Educational institutions worldwide are struggling to find solutions to dealing with the impact of the pandemic (Rieley, 2020). A more transformative approach is needed within the education sector and with external stakeholders to develop an inclusive and more sustainable future.

SUSTAINABILITY, EDUCATION FOR SUSTAINABLE DEVELOPMENT, AND THE SUSTAINABLE DEVELOPMENT GOALS

Sustainability implies a long-term goal towards a sustainable world, whereas sustainable development indicates the processes required to achieve the goal (UNESCO, 2020). With the publication of ‘Our Common Future’ in 1987, the use of the word ‘sustainability’ endured a period of accelerated evolution (Brundtland, 1987). Nowadays because of the social and environmental issues facing the world, sustainability has been increasingly used to highlight the processes and actions undertaken to avoid the depletion of natural resources and balance environmental, social, and economic factors in equal harmony (Parkinson, 2011). Sustainability is seen as a paradigm for thinking about the future ideals and principles such as gender equity, poverty alleviation, social tolerance, natural resource conservation, environmental preservation and building just and peaceful societies.

The concept of sustainable development emerged as a response to concern about human activities impacting the environment. At the end of the 20th century, sustainable development became one of the driving forces due to the failure of fair economic growth and concern about a forthcoming ecological crisis (Du Pisani, 2007). Sustainable development according to De Haan and Harenberg (1999, p.16) “is a collection of positively evaluated conditions and trends across a wide range of environmental, economic and social sectors”.

In the sustainability discussion, the rescuer has often been education, with a mission to change both individuals and the society. Educational processes and education play a very important role in this future

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oriented development (Seitz, 2002). At the Stockholm Conference in 1972 (UNEP, 1972), the role of higher education for environmental conservation was emphasised and promoted. The Brundtland Commission was established by the UN in 1983 to re-examine environmental problems and to suggest how to address them. The concept of sustainable development found its way in the core elements of higher education after the Brundtland Report, “Our common future” provided the widely cited definition ‘development that meets the needs of the present without compromising the ability of future generations to meet their own needs’ (Brundtland, 1987). This was followed by the Rio de Janeiro summit in 1992, which produced a blueprint for a sustainable future (Lozano et al., 2013). In this summit, the role of Education for Sustainable Development (ESD) was highlighted by focusing on quality education for all, incorporating sustainable development concerns in education and ensuring that training reflected sustainable development practices (Kirby, 1994).

At the UN World summit in Johannesburg in 2002, it was emphasised that a more sustainable world can be achieved by good quality education. The concept of ESD gained momentum from environmental education which sought to develop skills and attitude in people to care for their natural environment. The aim of ESD is to improve quality of life without damaging the planet and achieve this by integrating sustainable development into all aspects of learning and teaching (United Nations, 2002). Education for Sustainable Development is a priority for higher education as we share not only a pandemic but a planet. It is education that promotes changes in skills and knowledge to empower learners towards having a more sustainable society with respect to social justice, environmental integrity, and economic viability (UNESCO, 2020).

The UN General Assembly recognised ESD as a model for rethinking learning with the need to promote the entrepreneurial and innovative agenda in higher education. ESD reassess the curricula and education methods to include tools to tackle the climate crises and transform society. The aim is to form empathetic and critically minded students who can make change happen (Giannini, 2020). A whole school approach to ESD means that a HEI will incorporate sustainable development not only through the curriculum but in a more holistic manner call for the entire institution including educators, student, and administrators to play an active role on working towards a sustainable university/college (Sustainable Development Education Panel, 2003)

Good quality education is vital for achieving a more sustainable world. At the UN world Summit on Johannesburg in 2002, reorientation of education systems was mentioned as one of the keys to sustainable development. To promote ESD, the UN General Assembly with the United Nations Educational, Scientific and Cultural Organisation (UNESCO) adopted the United Nations Decade for Sustainable Development (DESD) from 2005-2014. The decade focused on creating a vision ‘of a world benefitting from quality education and a lifestyle required for a sustainable future and for societal and environmental transformation’ (UNESCO 2006).

ESD promotes social equity and economic sustainability by ensuring environmental protection and conservation through the development of the knowledge, skills and understanding required to create a sustainable world (United Nations, 2002). While the dominant focus of ESD is on environmental concerns, other key themes addressed are human rights, gender, corporate responsibility, biodiversity, ethics, justice, and natural resource management. ESD should be embedded in the curriculum in a holistic manner and promote critical thinking with an aim to create a sustainable world, which ensures environmental protection and conservation. It should address local as well as global issues, thereby ensuring that the content looks into the future and has a long-term perspective (UNESCO, 2006). ESD has always been fundamentally about values and respect for the environment and for the natural resources. Sustainability

is embedded in education to enable students to understand themselves and their links to the wider social and natural environment with the aim to build respect. One of the aims of ESD is to move us to adopt responsibility, justice, and dialogue (UNESCO, 2006).

Many researchers believe that humans are responsible for altering the physical, chemical, and biological conditions of the earth and have started to call this 'Anthropocene' and have called for a paradigm alteration. Clive Hamilton claim that humans live in a new geologic epoch, altering the physical, biological, and chemical conditions of the Earth. He wants humans to focus on the earth's systems and how they influence these systems. He clearly asks for humans to change their attitude towards nature and to learn to live in this world as it is (Hamilton, 2017).

Global environmental, social, and economic challenges have approached a tipping point. Sustainability is a goal for today and HEIs can help tackle the grand challenges and shape new ways for the world. Consequently, an increasing number of higher education providers assess the impact of their activities on the natural environment and other stakeholders (Wals, 2014).

Sustainable Development Goals emerged as an outcome of the United Nations Conference on Sustainable Development in Rio de Janeiro in 2012. These followed on from the Millennium Development Goals (MDGs) which focused exclusively on society. Then, we were asking whether the world could become a better place by 2030 (Meyer, 2020). The answer was yes; however, the world was caught by surprise around February 2020 with the unexpected arrival of coronavirus or Covid-19 that has now claimed several lives world-wide. The pandemic has changed the way we live and work. Covid-19 has spread in an unprecedented way and has undermined the progress towards sustainable development as a whole and implementation of the UN Sustainable Development Goals (SDG's), in particular. The 17 SDG's, along with 169 targets were launched in September 2015 by all 193 UN member states, with an aim to fundamentally transform the planet (UNESCO, 2020). SDG4 is dedicated to Education and SDG's 1,3,5,8,12,13 and 16 mention higher education.

Impact of Covid-19 on Sustainability and the Sustainable Development Goals

Covid -19 has radically transformed the current state of global development. Although the pandemic has reduced emissions worldwide, due to decrease in industrial activity and transport, poverty levels will worsen, and global inequalities will deepen (UN News, 2020). 2021 should see a rebound of 5.5 per cent according to IMF's latest World Economic Outlook (Scott, 2020). Therefore, the present time is the right time to make a change. According to the Sustainable Development Goals Report 2020, the world was off track to move towards a resilient and equitable society, even before Covid-19 threatened to reverse the progress. Now an estimated 71 million additional people are threatened to live in poverty by 2030 (UN, 2020).

The population affected by food insecurity has risen due to pressure on supply chains and household incomes, faltering the ambition under SDG 2 to end hunger by 2030. Most countries are off track to meet SDG 7 and environmental sustainability and in danger of increasing the number of people living in slums along with air pollution. SDG4 with the aim to achieve equitable education indicates that more than 200 million children will be deprived of education by 2030. Lack of access to computers and the internet have put many marginalised students at a disadvantage. Remote learning, although an option for some, is not within the reach of many. Almost 379 million children have missed out on school meals: threatening their immune systems and making them more vulnerable to diseases (UN, 2020).

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SDG 5 is more distant than ever on achieving gender equality as domestic violence cases against women have increased by 30% during the pandemic. Many women and girls have been hit hard by the pandemic, confined to their homes, often lacking access to mobile phones and with abusive partners. According to the report, in 2019, 39 per cent of women represented the total world's workers, but only 28 per cent were in managerial roles. SDG 16 to promote peace and safety from violence and SDG 17 to strengthen international partnerships is threatened due to the political tensions stoked by Covid-19 and hardening of national borders (UN, 2020).

This new and unpredictable context seeks a response to the role of education in sustainable development and in promoting a fair, equitable and sustainable society for all. This warrants instilling in students the desire to "create new visions and paradigms to make this world a better place" (Wolff, 2020). There is a need for HEIs to be more engaged in their eco-system, highlighting the importance of collaboration with stakeholders in research and knowledge exchange. ESD is a priority at this stage with an aim to form empathetic and critically minded students who can make change happen (Giannini, 2020).

Impact of Covid-19 on Higher Education

The greatest amount of research on the pandemic and its impact on higher education is centred around 2020. The following studies demonstrate the research trends in that year. Wolff (2020) showed how education can create new visions and paradigms to make this world a better place. Meanwhile, Giannini (2020), suggested forming empathetic and critically minded students who can make change happen. Zainurossalami et al. (2020), advised that a good government response as well as assistance from the higher education providers entails subsidies, special assistance, and availability of the internet.

Regarding education and sustainability, the point of evolution can be seen in 2005 and continues to gain momentum over the years. The following studies demonstrate this trend. Chalkley (2006), highlighted the need for Higher Education Institutions (HEIs) to embrace sustainability urgently and produce leaders who are sensitive to the sustainability agenda. In 2010, Martin and Turner suggested that students should be prepared with entrepreneurial skills so that they can act as agents of change leading innovative business models. Clifford and Petrescu (2012), focused on developing a closer dialogue with faculty and students to tackle real life issues and problems through research projects conducted with external partners. In addition, Mader and Mader (2012), argued that HEIs are trusted by people, have expertise in research and many have significant prominence. Therefore, they should initiate cross sectoral dialogue by playing a lead role in sustainable development goals (SDGs) implementation and policy development. In 2013, Delors, suggested that learners should be made to acquire knowledge to promote sustainable development. According to him, education can mobilise younger people by creating critical thinking, systems thinking skills as well as entrepreneurship and social responsibility. Waheed (2017), described how HEIs can help drive community projects and deliver triple bottom line benefits to the society at large. Findler et al. (2019), likened HEIs as facilitators of change. The encouraged universities and colleges to adopt the SDGs at a strategic level and connect with business, healthcare, community partners and entrepreneurs.

Most publications from 2005-2020 focus on concepts in the field of sustainability in higher education, including SDGs, developing an entrepreneurial mindset, collaboration with business and other stakeholders. They indicate the contribution HEIs could make to environmental management knowledge and societal transformation. Publications after the arrival of Covid-19 pandemic and mostly written in 2020 outline how university and colleges can play a critical role in shaping new ways for the world and

be engines of social and environmental transformation. Between 2005-2019, research trends appeared to be more diverse, with more articles highlighting sustainable development and its importance to HEIs, reflection on environmental issues and the importance of business education for sustainable development. In 2020 the research trends shifted to how change has taken place and what it means for higher education. Most publications on higher education and sustainability focus on providing a unique and timely commentary about how coronavirus has affected education communities and disrupted all areas of teaching, research, and service.

In each sustainability discussion, the role of higher education in changing both individuals and society has often been highlighted. HEIs should commit to a sustainable world, leading to transformative change. IUCN Acting Director General Grethel Aguilar declared that it is time for humans to acknowledge the vital link between a healthy planet and healthy people. Education will play a very important role in deciding where all these choices will end up (IAU, 2020).

Educational leaders have been plunged into an extraordinary catastrophe following the Covid-19 crises, calling for courageous and decisive leadership (Gur & Drysdale, 2020). Adaptive and innovative leadership is undoubtedly an urgent need. Leaders have a crucial role to play in the response of their institutions to a crisis and is best solved by establishing a culture of shared leadership and collaboration (Riera, 2008).

Online education was an uncharted territory for many universities and colleges calling upon leadership strategies to address the numerous challenges. Higher education providers had to immediately transition to online teaching and provide training to staff who initially found it difficult to navigate the online environment (Loriggio, 2020). Equity is also a major concern in distance learning as many students in developing countries do not have access to the internet or personal computers and laptops to support them for e-learning (UNESCO. COVID-19 Educational Disruption and Response, 2020).

The rapid shift to online teaching as a response to the pandemic was unplanned. Academics have been challenged to prepare and deliver classes from home, balance teaching, research and service obligations and maintain work-life balance (Hodges et al., 2020). Research shows that students were uncomfortable by the shift to online learning (Al-Tammemi et al., 2020). Challenges were faced in dealing with online education issues like unavailability of the internet, electronic devices, high internet cost etc., in developing countries.

Colleges and universities rushed to pedagogically prepare teachers with little or no experience in online teaching (Ching et al., 2018). Rapanta et al. (2020), experts in online teaching and learning highlighted the need for design flexibility. They proposed design flexibility by careful analysis of the learner, establishing a relationship with a cognitive presence to prepare students for the online learning experience, building a social presence to enhance the lost spontaneous class interaction and adopting a continuous assessment via self-paced, asynchronous activities as part of the learning process.

However, the transition to online learning has been challenging for students without access to the internet. Digital inequalities persist across most Asian countries. Only Brunei, Singapore and Malaysia have over 80 percent internet penetration. In Vietnam and Myanmar, less than 40 percent have access to the internet and in Thailand, Cambodia, and Indonesia around 60 percent have access forcing students to take loans for purchasing appropriate devices (Maslen, 2020). In India, people living in rural areas do not have access to technology and only 45 crore people out of 1.38 billion have internet/e-learning platforms (Kumar, 2020). In Bangladesh, there are four million students in universities and affiliated colleges (Ahmed, 2020). The government encouraged an online learning strategy during the closure of educational institutions during Covid-19. Due to low speed or no speed of the internet, many students

complained about the high cost as well as interruption of connection. This has caused immense disruption to the students learning and deterioration in the concentration to study from home (Meo et al., 2020). While in most prosperous countries teaching via Zoom and other video sharing software came into effect, education for South and Southeast Asia came to a stop. It is problematic to get an already substandard education system online. South Asia in particular contains a quarter of the world's population which is desperately poor.

EDUCATION FOR SUSTAINABLE DEVELOPMENT AS THE PATH TO A SUSTAINABLE RECOVERY FROM COVID-19

Deep reflections on aims and epistemology are of great importance in ESD alongside the careful choice of technology, methods, and equipment. Although digital learning is seen as the solution in the Covid-19 situation; there is a big risk of high dependency on the so called 'conflict materials' - tungsten, tin, 3TG and gold (Kim & Davis, 2016). Electronic waste is generated with hazardous health effects and the mining of 'blood minerals' causes human rights abuses and armed conflict (Kinniburgh, 2014). For example, the mining of conflict minerals in the Democratic Republic of Congo is related to the civil war (Raj, 2011). Although digital devices save time and the dependency on them have increased, it is not a very sustainable solution. Albeit the shift to e-learning seems inescapable as the move forward to distance educational process is the 'new normal' (Tesar, 2020). For the digital transformation in higher education to be successful, it must be based on sustainable management.

There is no clear answer on how to cope with the devastating effect of the pandemic and there is a dire need for innovation and creativity (Ansell & Boin, 2019). Universities and colleges need to stay alert and be adaptive. Covid-19 has caused many in academia to consider their role in entrepreneurship with calls for a radical review of curriculum and learning. Martin and Turner (2010) suggest that students should be equipped with practical knowledge to act in an entrepreneurial manner. Entrepreneurship educators prepare students for the type of skills they require in the workforce and advocate the use of experiential learning. The primary goal of entrepreneurship education is to deal directly with reality and connect with the business community. ESD is concerned with developing agents of change that can act for sustainability and lead to innovative changes to business models, such as Ray Anderson. He transformed his carpet business Interface Carpets after drawing inspiration from Paul Hawken's book, *The Ecology of Commerce* (Pascual, Klink and Grisales, 2011).

What is evident is, there are concerns around the pursuit of ESD because of the pandemic. Covid-19 poses the risk of destabilising the higher education sector, according to the International Association of Universities (IAU) (2020). Therefore, innovative solutions must be sought such as active engagement with the communities. Universities and colleges play a critical role in educating global citizens and helping shape the 'new world'. Being at the forefront in educating future leaders they act as facilitators of change and creation of a better world.

By adopting the SDGs at a strategic level, HEIs can connect with industry, business, entrepreneurs, healthcare, and community partners (Findler et al., 2019). A key to university engagement with the SDGs involves a closer dialogue with faculty and students to tackle real life issues and problems through research projects conducted with external partners and experiential teaching and learning (Clifford & Petrescu, 2012). As education providers become more connected with society, the journey towards a sustainable recovery of the world post pandemic can be accelerated. Partnerships with and stakeholders

can help higher education contribute to the well-being of our global communities (Lozano, 2018). By offering real-world learning opportunities for students and focusing on stakeholders' priorities, universities can help drive community-level projects and deliver social, economic, and environmental benefits to the society at large (Waheed, 2017).

At the same time research related to sustainability has been impacted by disruption caused due to the spread of Covid-19. Several meetings such as the SDH planning calendar, IPBES meetings, UB Ocean conference and others planned for 2020 have been postponed (Leone, 2020). To solve complex socio-environmental problems, transdisciplinary research models have been proposed, particularly in view of the implementation of the SDG's. Sustainable research requires the active involvement of HEIs, innovative companies and civil society (Schneidewind, 2014). Participatory sustainability research may be an ideal solution to ensure the effectiveness of research and societal consequences. The lockdown has affected the work of researchers because of constraints for accessing facilities, physical libraries or access to the internet and other challenges. Biomedical scientists who depend on wet labs for their research have been impacted (Safeguard research in the time of COVID-19, 2020). A community-based collaborative project initiated by a Professor of Engineering in Greenland for creating green energy solutions has been delayed (Pope, 2020). Covid-19 has also had a negative effect on fieldwork (Sastry et al., 2020). International conferences which are used by HEIs to promote their sustainability agenda through diverse stakeholder participation have either been cancelled or postponed.

The extent to which the pandemic will have lasting impacts on sustainability driven research is unclear (Cohen, 2020). Despite this there has been an increase in new ideas for sustainable development research such as the announcement made by the European commission to spend up to \$186 million on Covid-19 research (EU, 2020). In the sustainability discussion, the role of higher education has often been the rescuer, entrusted with the task of changing both individual and society. In the contemporary Covid-19 crises, the question is how, since both are driven by the national and global economy as well as politics (Foucault, 1970). Maybe education needs a transformation and leave the door open to question the idea of sustainable development.

Putri et al. (2020), draw attention to the role of leadership in higher education sustainability. Leal et.al (2020), define sustainability leadership as 'implementation of sustainable development policies and other initiatives within the organisation undertaken by academics, policy makers and leaders. This may involve adopting an array of measures such as institutionalising the incorporation of sustainable development issues by means of sustainability action plans or work programs, setting SDG related goals and assessing progress towards their achievement and engaging in leadership-led training initiatives aimed at raising awareness among staff and students.

Education providers should integrate the SDGs in their courses and provide training to all the course content developers as well as teachers. Young people are creative, optimistic and want to make meaningful global contributions (Wiek et al., 2011). To prepare students for jobs of the future education providers can form links with business and the industry and cater to skill requirements. Courses can be built around real-world collaborative projects driving students to investigate relevant theories and apply suitable research methods to determine appropriate business practices. The aim is to acknowledge ethical decision making, engage with systems thinking and complexity and take a stand on important issues like sustainability and climate change. Quality education (SDG4) can lead to sustainable development benefits for countries. It targets equal access to education for men and women by 2030. The aim is to ensure that learners acquire knowledge to promote sustainable development (Delors, 2013). Quality education can lead to improved development of countries and better access to employment, resilience to disasters and

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more engaged citizens. Education empowers and mobilises young people and creates critical thinking, systems thinking skills as well as entrepreneurship and social responsibility.

To shape the global SDG agenda, research in physical and social sciences as well as engineering and humanities is fundamental. Universities and colleges can become hubs of innovation to support businesses such as start-up companies that provide services for sustainable development. Collaboration of HEIs with NGOs and communities can play a role in policy development for sustainable practices and community learning programs. This can invite funding for research by the government as well as facilitate knowledge exchange with communities and countries. The aim is to fight poverty, protect the environment and address climate change as well as focus on prosperity and peace. HEIs are major players, have expertise in research, are trusted by people and many have significant prominence. Therefore, they can initiate cross sectoral dialogue and play a lead role in charging forward on sustainability transformation (Mader & Mader, 2012). For example, students have committed to volunteering for communities, reducing wastage of food, focusing on sustainable consumption, and even doing a doctorate in sustainable development. Subjects can be developed which help understand the role of business in addressing social issues and eradicating poverty. Awards such as excellence in sustainability is an example of recognition of work done and encourages staff and students to contribute to sustainability.

The Role of PRME in Sustainable Transformation

In early 2020 the world was surprised when a novel coronavirus (Covid-19), quickly spread across the world and impacted all areas of teaching, research, and service. It caused social, economic, and environmental effects. Higher education providers need to become agile in shaping and delivering the skills of the future and anticipating the demand from the business sector. Universities and colleges can play a significant role in shifting the mindset of businesses towards sustainability by building future business leaders. For business sector recruiters a combination of digital skills, flexibility, agility, teamwork, and management skills are particularly attractive in the current context of the labour market. Covid-19 has made learning new ways of work more important.

As of April 2019, 767 business schools from more than 80 countries have joined the UN Principles for Responsible Management Education (PRME) with the aim of educating students about sustainability. PRMEs mission is to transform management education and develop the responsible decision makers of tomorrow to advance sustainable development (PRME, 2020). PRME inspires and champions responsible management education and research. It is the result of efforts by the UN, the European Foundation for Management Development (EFMD), the Association of Advance Collegiate Schools of Business (AACSB), Aspen Institute's Business and Society Program, the European Academy of Business in Society, the Globally Responsible Leadership Initiative (GRLI), and Net Impact and the Graduate Management Admission Council (Aspen Institute, 2009). The program is committed to transform and redefine the learning and teaching strategies as well as research on sustainability issues in higher education.

The PRME Innovation Challenge is part of the PRME SDG student engagement platform and brings together teams of interdisciplinary students from the signatories to work with a company partner to build sustainable business solutions addressing the 17 SDGs. The program aims to connect companies with next generation innovators and entrepreneurs (Heartle et al., 2017). The participating companies will define a challenge specific to their own business and a team of students will develop a solution to that challenge. This student engagement opportunity provides companies with an additional set of ideas to support their SDG solutions while giving students the opportunity to gain insight into the process of

corporate innovation. This allows the students to put knowledge into practice while addressing the SDGs (Kiyatkin et al., 2011). Students will also gain experience in top tier companies and expand their social and professional network. Students work virtually with companies with the possibility of site visits. For example, one company is the Manitou Group which has decided to focus on CSR as an opportunity to be a part of global transformation (PRME, 2020). The PRME challenge is to identify what are the innovative solutions for sustainable transformation. Students can gain insight into the process of corporate innovation while providing ideas to the company to address the SDGs (Rasche & Escudero, 2010).

CONCLUSION AND LONG-TERM OUTLOOK

It will take many years to recover from the manifold damages posed by Covid-19 to the world economy and society. Even though some countries have managed to curb the spread of the virus, there are other nations reeling from the effects of the pandemic. Against this background, it may hold true that the focus on sustainability may be affected. Countries had to refocus and faced a shift in priorities to ensure the health and safety of their citizens. It would be reasonable to assume that they would relegate global sustainability strategies to the backburner. Covid-19 has already undermined opportunities offered by the SDGs such as eradicating hunger, fighting poverty and equal education for all. It is imperative to put emphasis on the implementation of SDGs so that the progress achieved pre-Covid-19, is not endangered. While the events of 2020 were unexpected, they have only accelerated the need for sustainable development. Looking ahead, the education sector, businesses and the government must implement several trends on a global scale to create a sustainable future.

Higher education needs to engage in and commit to a transformational process of promoting a fair, equitable and sustainable society for all. Covid-19 has unleashed a tsunami of human suffering and achievement of the SDGs looks bleak. There has been a tremendous amount of loss of lives and deepening poverty and hunger. Global GDP will contract sharply, and millions can be pushed into extreme poverty. 10 million of the world's children could face malnutrition and the number of people facing acute food insecurity could double. Although the outcomes are dire, education providers can help educate the public as well as re-skill the workforce to support recovery from the crises. It is important for education providers to solve societal problems and help facilitate collaborative initiatives to aid with response and recovery. Educators should commit to nurturing and supporting future leaders who will create a better world, by encouraging students to share a commitment to common values, including care for the planet, ethical business practice and social responsibility.

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