Scalability and Sustainability of Business Models in Circular, Sharing and Networked Economies

Edited by

Adam Jabłoński and Marek Jabłoński

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INTRODUCTION

The mechanisms of the functioning of the present economy are diametrically different than they were a few years ago. New technologies and total digital transformation have opened up new spaces, not only for the development of companies, but many sectors of the economy as well. It determines the new spaces and dimensions of modern business. Being on the boundary of the real and virtual worlds, companies have begun to search for the best possible solutions to achieve a high level of effectiveness, in particular in the digital business ecosystem. The new shape and image of technology brought about by the next generation of Industry 4.0 set out a new path, not only to achieving competitive advantages, but also mutual exchange and cooperation. New economies have emerged in this environment. The network economy based on the network paradigm has become particularly important, mainly due to the ever-stronger position and role of network societies. This is where companies began to search for efficiency and effectiveness in business. The consequence of such strategic thinking was that companies strove to obtain results related to the network effect. At the same time, the pursuit of dynamic growth and ownership of large resources has ceased to matter. The borderless business world increasingly began to realise that good business is a scalable business that is configured in such a way as to ensure business continuity, regardless of the prevailing conditions, through proper adjustment and adaptation to market opportunities around it. Hence, the ability of a company to scale and survive on the market through the permanent management of its interfaces towards the optimal income generation logic - with the simultaneous presentation of an interesting, innovative proposition of many values - became crucial. Such design thinking of companies embedded in the network began to bring measurable results, especially in relation to access to resources in the networks. The approach to defining and managing the value chain also changed. Due to digitalisation of the economy, classic value chains began to change, becoming significantly shorter. Everything became SMART, especially due to the impact of the new DNA of digitalisation, from SMART INDUSTRY to SMART people. At the same time, new design thinking resulted in the joint implementation of traditional and digital thinking by business architects. It triggered the so-called circular economy where the management of repeatable cycles of resources and the generation of

emerging new resources in an effective life cycle became particularly important.

It is also worth noting that the implementation of business processes in networks has changed the approach to defining and implementing the main strategic goals of companies. Social goals have started to play a significant role against a background of economic goals, which, to a large extent, affected the sustainability of companies in business. This was also influenced by the strong impact of the concept of sharing, which began to open new spaces and perspectives for the development of companies, especially in the era of servitisation. Such strategic changes have led to the need for scientific search and investigation in the area of strategic directions related to key ontological beings of companies such as business models, strategies, business processes and strategic projects. Among these four beings that create a kind of strategic hybrid, the concept of business models is definitely highlighted. This concept has even caused a storm in management sciences, especially in the context of the existing subversive era of economics.

Business models which convert payments into profits during the period of building space for their monetisation have become the determinant of the modern success of many organisations. Business models that are a configuration of many unique resources, or have access to them, have become a platform for market victory measured by the sustainability of companies and their ability to be continuously scalable, among other factors. A constructive comparison between the three key factors has emerged in this cognitive perspective. The first factors include management mechanisms going towards the conceptualisation and operationalisation of the business models of companies. The second group of factors includes the search for the organisation's main goals in today's business world based on scaling and survival. Finally, the third factor is the functioning of companies in new economies, which include the sharing economy, the circular economy and the networked economy. From this perspective, the scientific problem described in this monograph, which is worth solving, has come to the forefront - namely the scalability and sustainability of business models in the sharing, circular and networked economies.

This issue can be solved, among others, by defining related key resources, key success factors and new value drivers. This is where the research question arises: How to conceptualise and operationalise scalable business models which ensure the survival of companies functioning in the sharing, circular and networked economies? The monograph and its individual chapters attempt to answer this research question, which is crucial for management sciences.

The monograph consists of 12 logically related chapters constituting a certain substantive whole in the area of the scientific issues discussed. The structure itself has a systemic character that is supposed to lead the reader in thought disquisition through the meanders of management sciences in the context of the scalability and sustainability of business models. In chapter one, authored by Bogdan Nogalski and Arkadiusz Rokicki and titled "Technological progress and management studies", the authors point to key aspects of technology in modern business management. This chapter is a voice in a discussion on the role of technological progress in the development of management theory and studies. The advance of mechanisation in the organisational environment leads to a world where intelligent machines make decisions based on algorithms and machine learning. It can be expected that the role of technology will increase in an organisational context. The underlying thought of the chapter is that technological progress has determined the development of management studies. The aim of the chapter is to provide evidence to support that idea. Management theories will be divided into those with direct technological impact and those where technological influences can be observed indirectly. The reasoning will be supported by the concept of four industrial revolutions. The latter will be subsequently confronted with the management theory scheme as presented by S. Lachiewicz and M. Matejun (Lachiewicz, Matejun, 2012, p. 89). The chapter also indicates further research areas that might reveal the need to create new management approaches as organisations progressively achieve automation in many areas. Chapter two is titled "Network relationships in achieving the Sustainable Development Goals" and its authors are Joanna Dzieńdziora, Magdalena Wróbel and Dawid Żebrak. The aim of this chapter is to present network relationships in achieving the Sustainable Development Goals with special consideration given to the areas of activity of the 2030 Agenda. The 2030 Agenda for Sustainable Development is a framework plan for the world, setting global goals from the perspective of the year 2030. Its structure includes a set of 17 sustainable development goals adopted by 193 UN member states. The 2030 Agenda aims for the formation of a fair world, which is based on respect for law and rules which are conducive to social inclusion. In this study, the literary analysis was used as the main research method. This analysis allows the authors to conclude that the goals of the 2030 Agenda oblige various entities to build network relationships based on close cooperation aimed at promoting behaviours that allow for economic growth, social development and environmental protection. Its main idea is also the pursuit of development, which will guarantee a dignified life for all. In chapter three entitled

"Development of business models and their key components in the context of cyber-physical production systems in Industry 4.0", Bożena Gajdzik pays attention to the fact that the development of cyber-physical production systems (CPPS) is associated with the popularisation of the concept of Industry 4.0. The concept was publicised after the Hanover Fair (2011) as Industrie 4.0 (Zühlke, online). A large number of scientific publications and research reports are already available on Industry 4.0. There is no universal definition of Industry 4.0, and the scope of changes in individual publications describing Industry 4.0 is varied. It is assumed that Industry 4.0 is a product of the fourth industrial revolution with the vision of intelligent factories built of intelligent cyber-physical systems (Lasi et al., 2014). In chapter four, Wioletta Wereda and Jacek Woźniak address the issue of the maturity of relational sales and customer service in the sector of innovative enterprises: a basis for constructing a business model. Contemporary sales are significantly different from those from a few decades ago, which mainly consisted of making a purchase transaction. In the past, it was associated with sitting and waiting for the customer at the point of sale, while the new approach to sales is based on a more active approach and on building customer relationships. Meeting the expectations of customers, direct sales, sales based on identifying customer needs, and online sales are terms that should increasingly be the basis for the functioning of contemporary organisations. The main purpose of the purchase is to satisfy customers that they would gladly return to the enterprise in order to take advantage of commercial services once again. It should be emphasised that sales do not necessarily involve forcing the product to be purchased and should not be associated with intrusive activity on the part of the seller. Therefore, it must be a complex process; if these sales are initiated by learning about the needs of a potential client, there is a high probability of completing the transaction with great success. Chapter five is also important; it is written by Małgorzata Smolarek and Monika Sipa and titled "CSR - a direction for the sustainable development of small and medium-sized enterprises. Current research trends in light of selected literature". Expecting social acceptance for the ways and effects of their functioning, organisations extend their responsibility towards the environment. Entrepreneurs' greater awareness in terms of perceiving problems connected with their organisation's impact on the environment results in taking the environment, social interests and relations with various groups of stakeholders into account as early as at the stage of establishing the strategy. Taking such an approach is called the concept of corporate social responsibility (CSR), which is one of the most modern and promising business strategies on today's market. It is mainly large

enterprises that are interested in this type of activity, whereas small businesses recognise CSR issues, but do not necessarily have knowledge of the standards in terms of implementation. In chapter six, Marek Jabłoński addresses a fundamental issue of the relationship between the monetisation and profitability of digital business models. The chapter presents the issue of the monetisation of business models of enterprises operating in the digital economy. The author assumes that every business model should be monetised, and thus be economically justified. Attention was paid to assessing the profitability of the business models studied and defining the sources of their revenues, as well as analysing the economic and social benefits of key actors. The aim of the chapter is to conduct a critical analysis of the sources of the monetisation of business models of selected enterprises operating in the digital economy. Magdalena Syrkiewicz-Świtała, Rafał Świtała, Piotr Romaniuk, Joanna Kobza and Ewa Ptak are the authors of chapter seven entitled "The sustainable marketing mix of pharmaceutical companies". The pharmaceutical market is considered one of the most profitable and innovative in the world. It is very stable and not sensitive to the turmoil associated with economic crises. It must, however, meet the needs of humanity associated with global health problems and social expectations. The current trends require pharmaceutical companies to focus on social and environmental activities while maintaining economic rationality. Therefore, these entities in particular are obliged to manage the ideals of sustainable development. In order to meet market demand, the companies are forced to undertake sustainable activities in all aspects of management operations, as well as in marketing activity. The aim of the study is to present the possibilities of implementing a sustainable marketing mix to pharmaceutical companies in terms of the specifics of the industry and drug market. This chapter provides an overview of the literature. Pharmaceutical companies which achieve their goals in accordance with the concept of sustainable marketing can contribute to the development of a competitive advantage in the pharmaceutical market. In chapter eight Marek Jabłoński and Piotr Janulek focus on tokenisation as specific digitalisation of business models. Entrepreneurs are interested in finding optimal communication and collaboration systems which can generate additional value for customers, redefining a business model anew in the context of emerging technological opportunities. In the aspect of technological paradigms which are suitable for contemporary business conditions (such as the Internet of Things, Big Data, etc.), we are witnessing the transformation of traditional business models into digital models. So far, the theory of management has left the gap open; researchers are attempting to fill it by analysing digitalisation in business models. This

section aims to identify and discuss the results of desk research into the potential application of tokenisation to designing innovative business models. As part of broader-scope research into the digitalisation of business models, in this part of the research the authors address modern forms of crowdfunding, investment in assets, digital residency, the specificity of smart contracts and opportunities to monitor the supply chain. This is how an outline of the concept for the application of tokenisation to the digital transformation of business models emerges. In another chapter Piotr Barczak addresses the issue of thermodynamic equilibrium in a small family business. Thermodynamic laws affect all processes occurring in the environment around us. One of the objects that is subject to these laws is a small family company, which consists of several people creating a system that is part of the economic space. A company is also a system that always comes back to equilibrium regardless of processes and running time. If this is not the case, the company disintegrates and sometimes ceases to exist. A helpful issue in the sustainability analysis of the company is group synergism and the concept of synergy, understood as functioning in a limited environment, a group operating on the basis of limited resources, both financial and biological.

Łukasz Makowski and Tomasz Grzegorzyca also pay attention to important issues in the chapter titled “Factors and mechanisms and actions supporting the restructuring process”. In the case of unfavourable changes taking place inside the company, or in the external environment, adaptation and restructuring activities play a key role in limiting or completely eliminating the possible effects of these changes. Well-planned activities and the appropriate manner of their implementation may positively affect the financial condition of the company and ensure its stability. Developmental, corrective and preventive actions may even be elements of building a competitive advantage through rational and adequate reactions to specific changes. The aim of this chapter is to indicate and to extract determinants and mechanisms and actions supporting the restructuring process. The hypothesis that adequately carried out restructuring measures ensure the stability of the company and maintain its market position was adopted. It was also assumed that both remedial and developmental actions can build a competitive advantage. In their next chapter, the same authors, i.e. Łukasz Makowski and Tomasz Grzegorzyca, present an analysis of the restructuring process of Poczta Polska SA. In certain situations, adaptation and restructuring activities play a key role in order to limit and / or completely eliminate the possible effects of negative changes or trends that occur in the internal environment or the external entity. Properly planned activities and appropriate implementation should positively affect the

financial condition of the company, as well as ensure its stability. Developmental, corrective and preventive actions can, or even should, constitute an element of building a competitive advantage achieved as a result of rational and adequate reactions to these changes. The purpose of this chapter is to analyse the restructuring process in Poczta Polska SA. The research methods used in this chapter are analyses of reports and statistical data, as well as internal documents of Poczta Polska SA. This chapter assumes that properly conducted restructuring activities guarantee the stability of the company and maintain its market position. It was also assumed that both remedial and developmental actions can build a competitive advantage. The chapter presents an analysis of restructuring measures taken by Poczta Polska SA, starting from the company's designation of restructuring goals, to formulating a recovery plan and clarifying strategic tasks. Subsequently, the analysis of the restructuring activities undertaken by the company was undertaken, based on the set goals and strategic tasks. In addition, the chapter shows activities that were the answer to the threats then present on the postal services market, which were supposed to contribute to the defence of revenues and generation of profit by the company. The collected research material has been presented using a chart and tables and accompanied by comments. The last chapter by Bogdan Nogalski, Adam Klimek, Joanna Czerska, and Agnieszka Szpitter focuses on the formation of a state institution on the basis of a process analysis. The modification of the structures of public administration encounters major obstacles. Institutional changes are difficult to introduce due to their complexity and broad impact. Non-substantial (political) factors are of importance as well. The resistance to change is aggravated by how difficult it is for decision-makers to assess the impact of the proposed changes.

The monograph influences many key areas of business science and practice. It is mainly embedded in the field of strategic management with a special focus on the concept of business models and the new dimensions of the economy, and refers to the network and system paradigm. In terms of economic conditions, it is based on the principles of the sharing economy, the circular economy and the networked economy. Such a multi-faceted approach makes the monograph holistic, creating a comprehensive image of a multidimensional market. From this perspective, it can be a specific platform for the development of business theory and practice. Editors hope that the monograph will not only make for excellent reading but, above all, will become an inspiration for a wide range of readers interested in seeking explanations for the complex phenomena of the modern world. The editors would like to thank the authors of the

individual chapters for sharing their thoughts and experiences, which allowed for a thorough exploration of the complex issue of the scalability and sustainability of business models in the sharing, circular and networked economies.

The monograph is multidimensional, and its very title pertaining to the scalability and sustainability of business models in the sharing, circular and networked economies points to various cognitive perspectives focused on several (both theoretical and utilitarian) problems embedded within. Therefore, the monograph should reach a wide audience. It should be read by theoreticians and scientists who deal with the issues of building and operationalising innovative business models, and also by students who explore the issues of strategic management and the new economy. Furthermore, it should be read by business practitioners, both entrepreneurs and top managers, who want to be business virtuosos, who can change their organisations and their business models. The monograph should be an inspiration which helps to change the way the communities around their organisations think and behave. Finally, it should be read by experts looking for inspiration in the development of modern management concepts.

Adam Jabłoński
Marek Jabłoński

CHAPTER 1

TECHNOLOGICAL PROGRESS AND MANAGEMENT STUDIES

BOGDAN NOGALSKI[1], ARKADIUSZ ROKICKI[2]

Abstract

This article is a voice in the discussion on the role of technological progress in the development of management theory and studies. The advance of mechanisation in the organisational environment is leading to a world where intelligent machines make decisions based on algorithms and machine learning. It can be expected that the role of technology will increase in an organisational context. The leading thought of the article is that technological progress has determined the development of management studies. The aim of the article is to provide evidence to support that idea. Management theories will be divided into those where technology has a direct impact and those where technological influences can be observed indirectly. The reasoning will be supported by the concept of four industrial revolutions. The latter will be subsequently confronted with the management theory scheme as presented by S. Lachiewicz and M. Matejun (Lachiewicz, Matejun, 2012, p. 89). The article also indicates further research areas which may reveal the need to create new management approaches as organisations progressively achieve automation in many areas.

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1. Introduction

Technological advancement is considered a factor in determining civilisational progress (Skowroński, 2006, p. 48). As pointed out by A. Skowroński, "*the development of science and technology improves our lives, changes its quality, enables us to discover the world, cure people, broaden our horizons etc.*"' (Skowroński, 2006, p.48). Technological advancement is also considered a driving force of economic growth (Rensman, 1996, p.3). Economics recognises the paramount role of changes in technology. According to R. Solow, in the long term, technological progress brings an increase in productivity, despite the decreasing marginal productivity of capital and labour (Skawińska, 2011, p.9-10). Other authors regard changes in technology as superior to other factors, creating a deeper and more stable basis for productivity growth (Jagas, 1995, s.37). The argument that technology growth is a major force in creating economic growth is supported by Nobel prize winner P. Krugman, who described technological progress (understood as the technical means to produce goods and services) as the main factor in the growth of productivity (Krugman, 2012, p.135). Krugman also stated that it is very often not only great technological breakthroughs, but also an aggregated sum of small inventions, which play that role.

Economic sciences also recognise the links between technology and management. As noticed by G. Mankiw and M. Taylor, it was predominantly Henry Ford's technical knowledge (the knowledge of the best methods of producing goods and services) that determined his success as a car manufacturer (Mankiw, Taylor, 2014, s. 72). In Ford's case, one can argue that the origin of that success story was both his ability to organise work (management skills) as well as his technical aptitude, including its practical application. Mankiw and Taylor state that technological progress means, as it is the reason for an increase in quality, that the average productivity of capital and labour is higher for any amount of both. On the other hand, this means that the economy is able to manufacture more goods and services with the same pool of resources at its disposal (Mankiw, Taylor, 2014, p.72).

The impact of technological changes on the economy is substantial enough that it warranted the creation of a periodisation approach for economic history based on five stages. The scheme below was suggested by W. Rostow (Rostow, 1960, p.4-16):

1. The traditional society – identified with the natural economy, with agriculture being the main branch, as well as low labour

productivity. Technical innovations were sporadic and the minimal level of technological progress brought low production capability.
2. The preconditions for take-off – starting in western Europe at the end of the 17th century (Isaac Newton and scientific progress). Characteristics of that period include the increased division of labour and innovations supporting several organisational methods such as craft production.
3. Take off – from the end of the 18th century, linked to advancements in technology which brought about increased efficiency in manufacturing industries and agriculture. This is the period in which the first factories were set up as a consequence of the invention of electricity, engines and assembly lines.
4. Drive to maturity – during this stage, technological changes became commonplace in all fields of the economy, occurring approximately 60 years after the previous stage.
5. Age of high mass consumption – the 20th century, the era in which the economy was able to fulfil all consumer needs. This is also where services are the basis of the economy as opposed to manufacturing industries. According to Rostow, the breakthrough moment was the popularisation of cars.

To summarise this part of the discussion, the impact of technological change on the economy has been proven. The same can be applied to the impact of the economy on management. Management as a field of study came about as a consequence of changes in the economy, mostly related to capitalism becoming the dominant system of production. The latter changes were caused by changes in technology. As stated by M. Kusters, management is a process of planning, organising, motivating and controlling work in an organisation and its participants as well as utilising all available resources to accomplish organisational goals (Kostera, 1998, p.5). Those resources are acquired from the environment external to the organisation (Brzeziński et al, 2007, p.12). Actors in an economy such as suppliers, clients, competitors or financial institutions are part of that environment (Koźmiński, Jemielniak, 2008, s.95). Therefore, the impact of technological progress on management is:

- **Indirect** – through processes in the economy that can be observed in the external environment, which would then influence organisational resources
- **Direct** – through initiating changes in organisational approaches

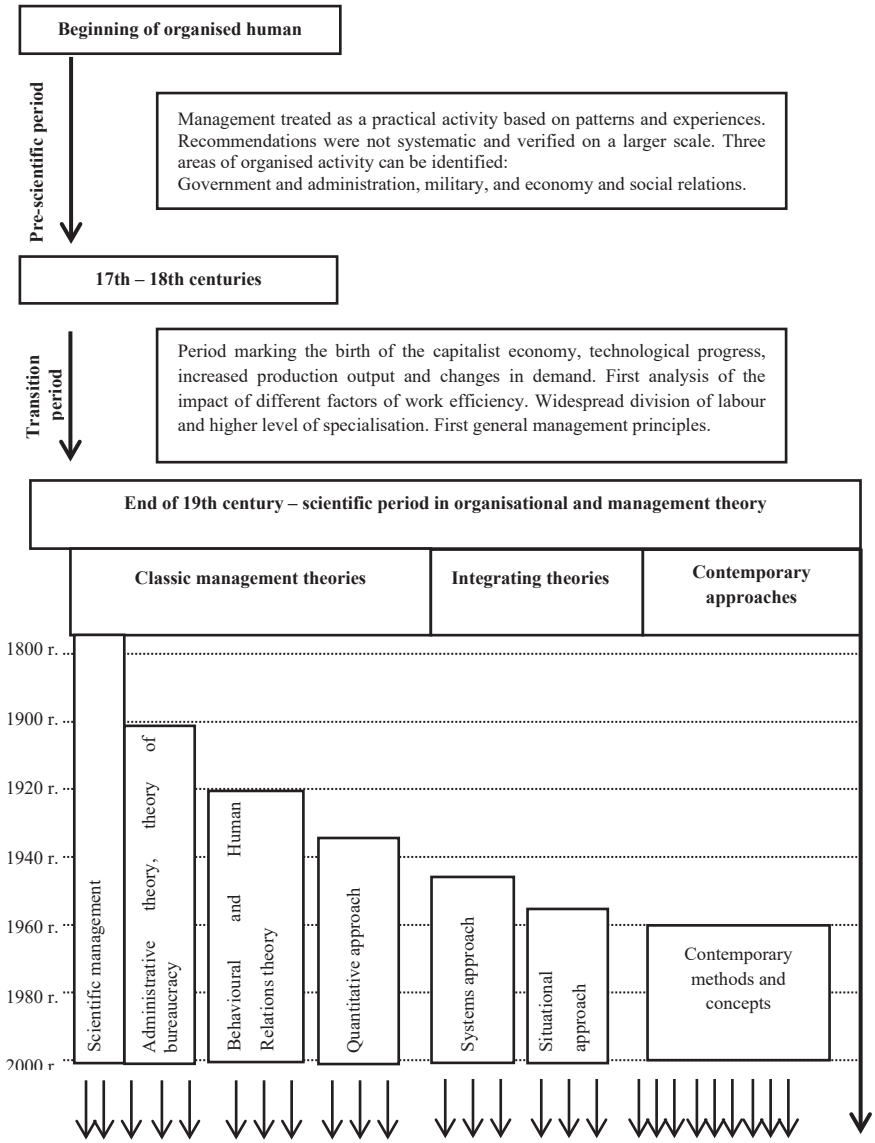

Fig. 1-1. Evolution of the development of organisational and management studies
Source: Lachiewicz, Matejun, 2012, p. 89 (original in Polish, translation – AR)

This perspective is a basis for further discussion. To add another dimension, the model of evolution of organisational and management studies as proposed by S. Lachiewicz and M. Matejun in their article "Ewolucja nauk o zarządzaniu" (English: "Evolution of management studies") published as part of a monograph called "Podstawy zarządzania" (English: "Management basics") in Warsaw in 2012, is shown in Figure 1.1.

The two authors divide the history of management into three periods: pre-scientific, transitional and scientific. The aim of this article is to investigate how technological progress determined and continues to determine management as a field of study and practical activity. The model described will be related to the events of four industrial revolutions:

Table 1-1. Industrial revolutions.

	First revolution	**Second revolution**	**Third revolution**	**Fourth revolution (Industry 4.0)**
Beginning	end of the 18th century	2nd half of the 19th century	1960s	early XXI century
Major development	mechanisation	electrification	digitisation	Internet of Things
Major innovations	steam engine	electrical bulb, telephone, first production line, oil refining	microprocessor, IT systems, automation	Smart City, Smart Factory, artificial intelligence, Big Data

Source: based on Palka, D., Stecuła, K., "Postęp technologiczny – dobrodziejstwo czy zagrożenie?", p. 588

2. Technological changes during the period of pre-scientific management

The pre-scientific period marks the beginnings of organised human activity. Lachiewicz and Matejun describe three areas of said activity:

a) Government and administration
b) Military and the art of war
c) Economy and social relations

The last area mostly relates to management studies according to the authors. In that context, they mention the construction of the Egyptian pyramids, where an extensive number of people were involved. To complete those tasks, referring to the planning, organisation and control of work was of paramount importance.

According to K. Łacny and M. Janczar-Smuga, in order to stay alive, humans had to use technology in order to obtain and prepare food from the outset. Furthermore, they state that technology is not only machines but also elements of practical and theoretical knowledge, the ability to utilise it, and the procedures and methods used to produce goods (Łacny, Janczar-Smuga, 2013, s.79). The real history of humanity starts from when people had to work together to achieve common goals.

It is accepted that the neolith agricultural revolution of 12,000 years ago had a direct effect on the abandonment of nomadic lifestyles and the increasing complexity of societies through growing plants and farming animals (Nowakowski, 2014, p.3). At that point, the first division of labour took place into those who grew plants and those who farmed animals (Legucka, 2016, p.100). That occurrence was supported by tools like the hoe, lister or plow pulled by animals (Topolski, 1993, p.50). A further division of labour was linked to subsequent technical innovations, for example the cart wheel, potter's wheel, loom, machine for brickmaking, copper- and noble metal-working (Spark, 2003, p.52). As investigated by Łacny and Janczar-Smuga, when groups of society dealing with farming, hunting or crafts developed as separate entities, a connection between technology and the organisation of work was established (Łacny, Janczar-Smuga, 2013, s.79). It is also important to highlight that the only sources of energy at the time were plants, animals and humans (Topolski, 1993, p.50).

With wheeled carts, bricks and metals at their disposal, it was possible to begin construction activities. As highlighted by J. Trzciniecki and J. Teczke, the effectiveness of work was analysed as early as during the construction of the Great Wall of China (Trzcieniecki, Teczke, 1998, p.9). Production planning and control took place in ancient Babylon (Walczak, 2012, p.99). One of the first thinkers who wrote about the division of labour in workshops was Xenophon (Gray, 2010, p.32). He claimed that a skilled, specialised craftsman could deliver better work than a non-skilled one. He advocated specialisation, understood as training the workforce to conduct specific tasks. This was supposed to bring about an increase in productivity (Wieczorek-Szymańska, 2010, p. 158). An example of highly organised human activity during Antiquity was the construction of 120 ships for the 260 B.C. war with Carthage which only lasted several months

(Walczak, 2012, p.99). Nevertheless, during Antiquity (as opposed to neolith), there was no considerable technical progress that would enhance the speed of production or cause major changes in the organisation of work. It is claimed that the reason for this was that there was insufficient demand for technological advancements. The other major factor could be the attitude of the ancient elites to physical work (Szpak, 2003, p.70).

A major breakthrough was observed in the 13th century as a consequence of the wider use of wind and water as sources of energy. It was a time when both windmills (http://wiatraki1.home.pl/wiatraki /info/historia.php) and water mills (Kaniecki, Brychcy, 2010, p.145) were becoming commonplace. Another key innovation was a fully powered water wheel (Lilley, 1963, p.61). All those inventions stimulated further division of labour in the economy, and different individuals became proficient in their field of work. The consequence was that the work conducted by one individual was an element of an interconnected web of work delivered by other individuals to provide goods for their societies (Szambelan, 1967, p.11-12). As demand for everyday goods was increasing (in itself an effect of technical solutions such as pottery-making or metal-working), the first craft workshops were set up in the 13th century (Tomaszewska-Lipiec, 2016, s. 85). A **craft workshop** can be defined as a production workplace where the mass production of a complex end-product was delivered manually and was based on the division of labour. Specialised, skilled craftsmen were gathered together to perform production processes divided into stages (Tomaszewska-Lipiec, as above). That type of organised production was popular in Florence in clothes-making (Beliczyński, 2012, p.163), where the production process was clearly divided into stages (cleaning, combing, colouring, weaving etc.) The spread of craft workshops is an example of the indirect impact of technological progress on the organisation and management of work. Innovations in production gave impulse to economic processes (increases in supply and demand), which enabled the emergence of craft workshops as organised human activity (Beliczyński, 2012, p.159). The more technological solutions which were introduced to production and tool enhancement, the more complex the division of labour became (Sołdaczuk, 1995, p.38).

Guilds are also worth mentioning in this context. These were groups of craftsmen performing the same type of work (Manteuffel, 1999, p.268) (for example: coopers, shoemakers, furriers). Guilds decided on and controlled the size of production output and therefore controlled the supply (https://encyklopedia.pwn.pl/haslo/cech;3883763.html). However, they also did not allow its members to use any technical innovations (such as

fulling or the spinning wheel) and as a consequence they would hinder both technological and economic growth.

3. Technological advancements during the transition period for management

The transition period covers the 17th and 18th centuries, during which production was growing and the division of labour became a main method of organising work. General management principles were also created. As the demand for goods grew, so did automation (utilising, for example, water wheels or grindery), which greatly added to the speed of production. As highlighted by Z. Wójcik, in the 17th century the development of craft workshops was still very slow, and had no decisive impact on the economy (Wójcik, 1999, p.17). Real change did not happen until the 18th century. The use of machines undoubtedly had a positive effect on productivity and therefore lowered the prices of manufactured goods. This, on the other hand, influenced both the demand and supply sides and created an incentive to set up companies. As companies were established, there was a gradual need to ensure a more structured approach towards their management. The link between technological progress and management was fully established. That phenomenon was further enhanced in light of the first industrial revolution.

According to Z. Madej, the craft workshop was the first milestone towards automated production, and the industrial revolution was the second (Madej, 2013, p.43). The 18th century was, in comparison, a period of extraordinary technical innovation. This can be tied in with a time of prosperity following the 17th century recession. S. Lilley presented statistics pertaining to inventions over the course of a few centuries. The 18th century largely stands out among them.

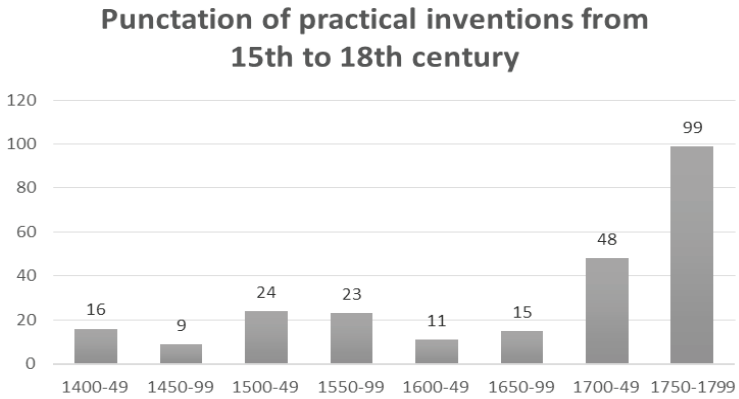

Fig. 1-2. Innovations from the 15th to 18th centuries as per S. Lilley.
Source: S. Lilley as per E. Rostworowski, 1999, p.42

J. Beliczyński has listed the forerunners of scientific management (Beliczyński, 2018, s.42-43). It is important to point out that the vast majority of them were engineers or had a strong technical background.
- Adam Smith – responsible for formalising the law of division of labour. In his opinion, the division of labour increases manufacturing output as it stimulates the competency and productivity of workers. Beliczyński quotes Trzcieniecki and Teczke who concluded that it was **the law of technical division of labour** that de facto heralded the emergence of organisational and management studies.

- Richard Arkwright – considered the inventor of enhanced weaving looms and the creator of the basis of manufacturing production systems. His inventions have greatly contributed to increased production and employment within the cotton industry.
- Ely Whitney – inventor, also thought of as a pioneer of mass production. He would provide workers with gauges or examples of parts that were supposed to be recreated and also used assembly lines in mass cotton production.
- Robert Owen – was of the opinion that division of labour brings about better utilisation of tools. He also thought that humans were more important than machines in the production process and the role of a manager is to enhance working conditions.
- Charles Babbage – mathematician and engineer, considered a pioneer in the scientific analysis of work process improvements. He

analysed production processes, the division and organisation of work taking into account factors such as time, cost and the choice of workers, machines and tools. From the point of view of technological progress, it is essential to highlight that this pioneer of scientific management can also be credited with creating the concept of computers. His difference engine was supposed to add, subtract, multiply, divide, as well as calculate tangents and cotangents. His inspirations were twofold:

a) the method of technical division of work created by Gaspard de Prony (Isaacson, 2014, p.20). De Prony proposed logarithmic and trigonometric tables and divided operations into steps involving adding and subtracting. He then prepared simple instructions for workers to enable them to complete their calculations and hand over the results to their colleagues who were responsible for the next step. That method also contributed to developing the concept of an assembly line. Babbage worked on a way to automate this process.
b) existing mechanical calculators created by Pascal and Leibniz in the 17th century (Goldstine, 1977, p.340)

Babbage did not complete his difference engine as he began work on an analytical engine. It was supposed to complete different tasks as it was programmed (https://www.britannica.com/technology/Analytical-Engine#ref1069898). He developed the idea that punched cards used in weaving looms are able to ensure the ability of the machine to accept an infinite number of instructions. The user could manipulate the sequence of events, which was the stepping stone to a general purpose, re-programmable machine. The analytical machine would not need to simply perform specific tasks as it could be programmed as required. Describing the abilities of such a machine, Ada Lovelace (who worked with Babbage), took the idea even further. She claimed that operations performed by the analytical engine do not need to apply only to numbers but also contain the possibility of storing, manipulation, processing and modifying everything that can be expressed via symbols (words, music etc.) (Manabrea, Lovelace, 1843, s. 21). Ada Lovelace also de facto introduced the concept of subroutines (a range of instructions for performing specific tasks). She also created a list of instructions with commentaries describing the target register and operations required, hence laying the foundations for computer programming.

The first industrial revolutions brought about a technological breakthrough in production. Manual work ceased to dominate and was gradually replaced by mechanisation, the outcome of which was the mass production of

certain goods as well as an increase in productivity. J. Szpak lists three main areas of change (Szpak, 2003, p.139):

a) Mechanisation of the textile industry – the most notable inventions were the spinning jenny (multi-spindle spinning frame) (James Hargreaves, 1764), and the power loom (Edmund Cartwright, 1785)
b) Intensification of iron production – brought about mainly by the application of coal and mechanical cylinders (Henry Cort, 1784, which eliminated manual work previously performed by smiths), the slide rest lathe (Henry Maudley, 1797, which allowed for the manufacturing of precise details of machines but also elements of bridges and iron rails)
c) Adoption of new energy sources – production growth would not be attainable if the only sources of energy were human or animal muscles, wind or water. The period of the industrial revolution is known as the age of steam (Szymanowski, 2018, s.15). The milestones for the utilisation of energy coming from water steam were the steam digester (1679/1690, Denis Papin – the first recorded use of energy from combustion), the steam-powered pump used in coal mines (1711, Thomas Newcomen), the steam engine machine (1769, James Watt transformed Newcomen's pump and in 1781 adapted it for rotary drive, therefore enabling its industrial use). New sources of energy found application in transport: the first steam-powered road automobile (Nicolas Cugnot, 1765), the steam locomotive (Richard Trevithick, 1804), a steam machine to power river boats and ships (Robert Fulton, 1807), and screw propellers for ships (John Eriksson, 1834).

The first industrial revolution brought with it overwhelming consequences. The intensification of productivity through the widespread utilisation of machines brought an increase in the size of production and a higher level of availability of goods on the market. Mass production became increasingly profitable. New businesses were set up, and those business required organisation and management. Without doubt it can be said that the advancements in transportation played a decisive part in this process as well, allowing the new enterprises to reach new markets with their offerings.

As mentioned above, in the transition period for management studies, general rules of management were created. The pioneers of management were, to a large degree, engineers and inventors. It is no surprise that the first scientific management principles refer to production processes

supported by machines. The emergence of machines in the course of technological progress drove changes in management rules. Engineers such as Babbage, Arkwright or Whitney analysed the division of labour, specialisation and mass production to address changes in technology. Those analyses were required to maximise the workability of new technologies. That approach was therefore a practical one. Hence, it can be said that the growth in technical capabilities was the impulse for the emergence of management studies as a field of science. Scientific management was conceived during the industrial revolution as it was only at such time that the appropriate stimuli existed.

4. Scientific period for organisational and management theory

4.1 Scientific management

It comes as no surprise that the official canon of rules of management was formulated at the end of the second industrial revolution. If we closely examine the achievements of technology in that period (Table 1-2) and analyse their consequences, then we can come to a conclusion that the structuring of management rules was in response to the sequence of events presented in Figure 1-3.

Table 1-2. Major inventions of the 2nd industrial revolution

Date	Inventor	Process or machine
1930s	Samuel Morse	Telegraph (1835) Morse code (1838)
1850s	Henry Bessemer William Kelly	Bessemer process
1853	Elisha Otis	Mechanised passenger lift
1867	Christopher Sholes	Typewriter
1876	Alexander Bell	Telephone
1877	Thomas Edison	Phonograph
1879	Edison and Lewis Latimer	Lightbulb
1869	George Westinghouse	Compressed air-brake
1885	Carl Benz	Car
1886	Westinghouse and Nikola Tesla	High-voltage alternating electric current (AC)
1903	Wilbur and Orville Wright	First plane flight

Source: based on https://web.archive.org/web/20131022224325/http:/www.education.com/study-help/article/us-history-glided-age-technological-revolution/ access 7.01.2018

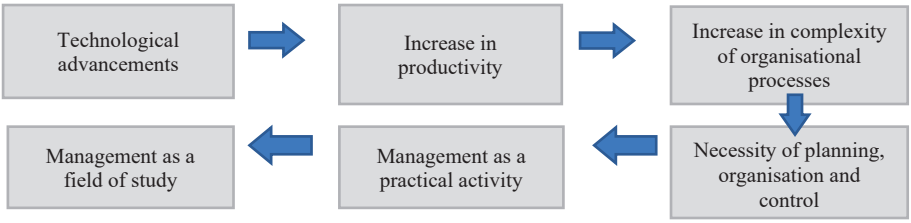

Fig. 1-1. Link between technological progress and management as a field of study
Source: AR own analysis.

As researched by M. Żywczyński, the extraordinary eruption of innovation can be observed predominantly between 1848 and 1971 (Żywczyński, 1999, p.414). Time was required for the inventions to reveal their benefits. For this reason, it was only in 1903 when Frederick Taylor and Karol Adamiecki - independently of each other - announced their rules of scientific management.

The greatest invention of the era was undoubtedly electricity. The period is also frequently called the age of electricity (Perez, 2010, p.12). Electricity (electric engine) and the combustion engine revolutionised and dynamised industry (Furmanek, 2018, p.56). As highlighted by M. Michalski, the dominant role of electricity in the second industrial revolution stems from the fact that it exerted influence on all other areas where inventions were born, and was also a determinant as to why they could develop dynamically. The spread of electricity as an invention had a decisive impact on the shape of the transportation industry, information communication as well as the functioning of cities and work processes in major industries (Michalski, 2017, p.8). The first battery was developed by Alessandro Volta in 1899 and the first electric engine by Michael Faraday in 1821 (Paska, 2010, p.10). The progress relevant to calculating machines is worth noting. In 1890 Herman Hollerith prepared punched cards enabling the recording of information (Manovich, 2001, p.8). Those cards were inserted into a reader composed of a board with connectors and joints which would close the electric circuit wherever there was a hole. This was the first time when electric circuits were used for mathematical calculations, and paved the way for the construction of computers 50 years later.

According to L. Kowalczyk, the foundations of the field of organisation and management studies were, to a great extent, laid by people with technical backgrounds (Kowalczyk, 2016, p.11). The main representatives

of scientific management were self-taught engineers or those with technical education (as listed by Kurnal, 1972): Frederick Taylor, Karol Adamiecki, Henri Le Chatelier, Henry Gantt, Frank Gilbreth, Leon Alford, Alexander Hamilton Church, Russel Robb, Charles Bedaux, and Aleksander Rothert. It is believed that Taylor's technical activity led to mass production becoming commonplace. It was his steel-cutting machine that quadrupled cutting speeds – the fruit of his experiments at Bethlehem Steel in 1900. According to J. Paxton, Henry Ford substantially took advantage of Taylor's invention, contributing to automobile mass production. As acknowledged by the latter author, even if there was some sort of mass production before 1900, the lack of relevant tools meant that the work still had to be finished manually. Mass production was in fact not economically viable. Also, for Karol Adamiecki, engineering activity was the starting point. He modernised rolling mills, compiled a quality control system for tinware, and constructed tools for measuring the deformation of cylinders (Martyniak, 1989, p.39, 41).

Mass production by itself would not have played such a defining role in terms of industry if it had not been for the development of transportation and communication networks. Parts required for production, as well as the products themselves, were quickly delivered by railways and information exchange was made possible by means of telephone and telegraph systems. Therefore, the exchange of goods was facilitated and technological advancements allowed for production and distribution planning as well as organisation.

Scientific Management, as a phenomenon, is a prime example of the interlinks between technical and organisational elements. The first management theories based on scientific research were created by engineers and practitioners for whom management theories constituted the means by which to enhance the productivity freed up by the progress in technology.

4.2 Administrative theory

The link between technological progress and the administrative theory of management can also be recognised. It can be observed that many (albeit not as many as in the case of scientific management) thinkers in this area come from a technical background, such as Harrington Emerson, Edwin Hauswald, Piotr Drzewiecki, and Zygmunt Rytel. Also, the main theorist of the administrative approach, Henri Fayol, worked as an engineer in the mining industry (Wood, Wood, 2002, p.87). Nevertheless, Fayol claimed that in any company, technical background can only be

attributed to lower management, whereas upper management needs to possess administrative skills (in addition to technical) to reflect the needs of their enterprises (Martyniak, 1989, p.91). Fayol did, however, recognise the importance of technical functions, listing them as one of six organisational dimensions.

The emergence of administrative theory was also the result of the sequence presented in figure 3. It was formulated shortly after scientific management and was in a way supplementary to it, in the sense that as the complexity of organisational functions and processes grew, it revealed the necessity of formalising the activity of members of management in order to further stimulate company efficiency.

4.3 Behavioural and Human Relations theory

This approach was undertaken by researchers from either economic and political (M.P. Follet), natural (J.F. Joteyko), or medical (E. Mayo) sciences, and only a few were technically educated (Tomasz Bata, Hyacinte Dubreuil, and Stanisław Bieńskowski to name but a few) (Martyniak, 1989, p.157-203). The Human Relations school of management only indirectly utilised technological progressions. Links with technology can be seen taking into consideration economic growth. In the 1920s, large-scale corporate enterprises were a fact of life, and when productivity increased (once again, mainly due to technical improvements), the focus shifted, in some circles, to the human element of the corporate structure and its effects on company output.

4.4 Quantitative approach

The Quantitative school of management chronologically follows management theory. Its origins can be traced to World War II (Gorynia, Kowalski, 2013, p.465). Scientists in countries engaged in the conflict worked on solutions to effectively support the war effort. One idea was to take advantage of mathematical methods and operational research to solve problems related to warfare (Lachiewicz, Matejun, as above, p.107). As pointed out by D. Jemielniak and D. Latusek, creating quantitative organisational models is directly related to the ability of computers to construct those models (Jemielniak, Latusek, 2005, p.55). It is therefore only appropriate that the development of that management theory coincided with the development of the first computers.

As electricity was becoming omnipresent, mechanical elements were being replaced by electrical ones. In 1937 Claude Shannon was inspired by

the functioning of telephone system switches (Waldrop, 2001). He then created a concept of utilising the binary system to present logical operations (and, or, if that then, neither nor, etc). He concluded that electric circuits could perform those operations by means of a switch set. A system of logical gates (switches transitioning signals from one or more entries) enabled connections to larger circuits. The switches could be opened or closed via electromagnets. Those circuits, consisting of switches, could be used to solve complex mathematical equations. Based on that architecture, the first computers were built between 1937 and 1945. The purpose of a computer was to perform a wide range of tasks. Programming the machine was vital in order to achieve this goal, otherwise it would remain a rather complicated calculator. That stage was reached in 1949 when the EDVAC model was released (Williams, 1993, p.22).

The creation of computers ushered in a new era in technology, which is frequently referred to as the third industrial revolution or the age of computers. This has led to a steady digitalisation of all enterprises where IT systems have become commonplace. Those systems not only supported the operational side of companies but also enabled strategies. It can be stated that, at the end of the third revolution, digitalisation had reached a similar level as the level of electrification had at the end of the second revolution. The third revolution has forced changes to both management practices and the emergence of new management theory concepts. The leading inventions of this period are:

a) **Transistor** – the construction of the transistor is crucial as it paved the way for the spread of electrical devices. The transistor was to the digital era what the steam engine was for the industrial era (Isaacson, 2014, p.131). It enhanced electric current and channelled it appropriately. The actual computing power could be located in a small space such as a calculator or in the nose of a space rocket. The invention of computers did not cause an immediate revolution as they required large and expensive vacuum lamps, which used a massive amount of energy and were highly susceptible to damage. Transistors replaced the lamps as a result. The first computers were costly giants; hence, only large corporations, research centres and the army could afford them. The invention of transistors was a sign that future computers could be smaller.
b) **Integrated circuit and microchip** – the integrated circuit is a miniaturised electric circuit containing anywhere from a few to

hundreds of millions of basic electrical elements (transistors, diodes, dimmers, capacitators etc) (https://encyklopedia.pwn.pl/haslo/uklad-scalony;3990973.html). This allowed for a reduction in the size of computers, so they could become personal through the integration of many elements. It was invented in 1958 and was produced and designed by Robert Noyce. Noyce later founded Intel and would sell the integrated circuits below production price. This led to enormous interest in the invention, and it subsequently became part of many devices, thus bringing about a rise in the demand for electronics. Noyce wanted the integrated circuit to be programmed to perform any given operation. That was achieved in 1969 when the microchip was first created to contain the integrated circuit, which truly opened the way for personal computers (PCs). The emergence of the microchip has also given rise to a large number of new companies which manufacture components and software used for personal computers (Isaacson, 2014, p.199). The invention of the microchip is considered the highlight of the age of computers (Bielski, Kaczmarska, Kwapisz, Szymczyk, 2017, p.2).

c) **Internet** – before the Internet, if a user wished for a computer to perform a task then he or she had to present computer operators a pile of punched cards or a tape and wait anywhere from a few hours to a few days for the results (often not being given the opportunity to see or touch the computer). 1969 is thought of as the beginning of the Internet, when a network between UCLA and Palo Alto was established. That also marked the beginning of communication as we know it, as the Internet enabled the exchange of information. As concluded by W. Wenzel and M. Feliksiak, traditional media such as radio or television was only one-way traffic – the information would be sent by one entity and would be received by others. The sender would not expect a reply (Wenzel, Feliksiak, 2012). The Internet had a tremendous impact on the growth of trade, the financial markets and the rise of the services sector. This is one of the main reasons why we are discussing the innovations of that period as the third revolution. Nevertheless, at the time of its construction, only those who had direct access to computers could make use of them. As mentioned, computers were large, costly and not sold in regular shops with IT equipment. Personal computers were required.
d) Personal computer (PC) – the concept of a PC can be traced back to 1945 when V. Bush published an article titled “As we may think”.

He imagined a machine for personal use that would store books, records or correspondence and where data could be inserted by means of a keyboard (https://www.w3.org/History/1945/vbush/vbush.shtml). To realise that dream, it was necessary to wait thirty years. In 1975 Altair entered the market; yet that in itself would not bring about its popularity. At the time, computers could only show green digits and letters on a black background. They had no applications and hence a regular user would have no reason to use them. That changed with Apple II, furnished with a spreadsheet and a text editor. It was a computer that was easy to navigate and fully integrated (hardware, software, keyboard, screen, mouse) (http://americanhistory.si.edu/collections/search/object/nmah_334638). Apple II created a market for personal computers which also became a business tool. The next step was to add a user-friendly interface resembling a desktop. Windows, by Microsoft, was the solution, as it eliminated the green letters on a black background.

The inventions of the third revolution brought tools that could be used in organisational management. If, according to the quantitative approach, it is necessary to model an organisation digitally, then computers facilitated that goal. Quantitative methods rely on access to information. Computers supported the storage, profiling and appropriate presentation of information enabling decision making. If the digitalisation of the business sector is advancing, the popularity of the quantitative approach in management is diminishing. The prime reason is that it is hardly feasible to model organisations using mathematical equations facilitated by computers. To establish that model, one would need to take into account all organisational aspects (Jemielniak, Latusek, 2005, p.55) which would mean acknowledging that organisations are in fact closed systems. It has been confirmed in literature that the latter is not true (Karcz, 2016, p.208). However, as concluded by T. Gospodarek, there are a range of management issues that can still be analysed quantitatively. He mentions simulations, optimisations and establishing execution possibilities (Gospodarek, 2012, p. 114).

5. Integration approaches

The integration approaches are, according to Lachiewicz and Matejun, systems and situational approaches.

5.1 Systems approach

The impact of technological advances on this school of management was indirect. The origins can be seen in the general systems theory consolidated in the 1930s (https://encyklopedia.pwn.pl/haslo/ogolna-teoria-systemow;3950288.html). As per A. Bednarski, as this approach widely uses modern IT systems, it is also called the information systems approach (Bednarski, 1998, p.58). According to this theory, an organisation (as a system) consists of sub-systems (technical, economic, social etc.) between which there is a balance and feedback loops (the effect of a change in one subsystem can be recognised in the others). The principles of systems theory are widely utilised in IT service management practices. ITIL, which is de facto a standard in that area, recommends the systems approach for service design (ITIL Service Design, p.44) and presents a computer as an example of a system (as above, p.424). Also, a standard for information security management refers directly to this theory by recommending it for developing information security models (CISM Review Manual, 2017, p.31). However, technology did not create an incentive to establish the systems approach. Having mentioned that, the fact that - from a practical point of view - this approach finds its application in the field of IT needs to be recognised.

5.2 Situational approach

This approach advocates an adaptation of the management method chosen by a given organisation according to the situation it is facing (Czermiński et al, 1999, p.29). It has been opined that the origins of the situational approach can be found in the works of Joan Woodward (1965) and the technological conditioning of organisational structure (Karcz, as above, p.220). Those opinions are vital from the point of view of this article, as Woodward's research originated a school of thought known as technological determinism (Klincewicz, 2016, p.111). Technological determinism meant that the technology used would influence organisational variables, and in particular the organisational structure and methods of work (Klincewicz, as above). If, for example, an organisation decides to use technologies relevant to mass production, then it will also need to adapt its methods of organising workflow to divide work into smaller subsets, standardise elements and ensure the specialisation of individual roles. Even though the concept of the situational approach is a post-war phenomenon, this article argues that technological determinism has been

applicable since the beginning of management in the form of both practical activity and scientific studies.

6. Contemporary management concepts

The authors of "Evolution of management studies" describe several concepts that, with varying strength, would surface since the 1970s with globalisation and the move to the so-called "new economy" (Lachiewicz, Matejun, as above, p.116). They also point out that the quality and ease of their implementations does vary. It is a fact that at the time of the third revolution and the related digitalisation, there was an eruption of different concepts and management systems. Many of them revealed tendencies to further evolve and formalise.

6.1 Benchmarking

Benchmarking refers to a reference point that makes it possible to illustrate how an organisation relates to a given standard (Wyrębek, 2013, p.136). For benchmarking to be successful, it needs to have specified procedures divided into steps. It is believed that the concept was the fruit of the visits of Japanese engineers and industrialists to the USA and Western Europe after World War II (Źródło-Loda, 2012, p.206). Those visitors had the goal of becoming acquainted with technical and organisational solutions in those economies. Those solutions were used to draw comparisons to Japanese methods and suggest opportunities for improvement. The motivation here was not just a willingness to implement the relevant technologies but also to eliminate the relative economic underdevelopment. The impact of technology on creating this management method was therefore indirect.

6.2 Reengineering

Reengineering, also known as Business Process Reengineering (BPR), is a method of undertaking radical changes in the organisational environment. A management approach consisting of dividing work into tasks and functions was replaced by dividing the organisation into cross-functional teams of people (Nogalski, Hałaczkiewicz, Witt, 1999, p.99). The authors of this concept, M. Hammer and J. Champy, developed it using IT systems in their organisation. On top of that, the name of this approach brings a clear connection to the world of technology which provided a sound impulse for its creation.

6.3 Outsourcing

Outsourcing, similarly to BPR or lean management, can be a consequence of a change of strategy (Nogalski, Macinkiewicz, 2004, p.84). It is accepted that its origin was the acquisition of German projects by the British car industry in 1979 (https://mfiles.pl/pl/index.php/Outsourcing). Technological influence is therefore evident. As stated by K. Klincewicz, digitalisation facilitated outsourcing, and IT infrastructure management became an attractive subject of outsourcing contracts (Klincewicz, as above, p.114). As the fourth industrial revolution advanced in the 2010s, outsourcing might increase its value as a management approach. Cloud technology is becoming the preferred way for organisations to provide their IT infrastructure; many of them choose to outsource their infrastructure to cloud providers. Onsite data centres and communications rooms would cease to occupy a major place in facilities management. The cloud offers a more attractive alternative.

6.4 Lean management

The concept was officially first used in Toyota and is credited to engineer T. Ohno (Faron, 2011, p.69). Lean refers to eliminating any resources needed for production that would not bring benefits in terms of delivering value to customers. The latter would apply to people, space, capital investment, time etc. (Zimniewicz, 2003, p.68) Making an organisation lean would involve “flattening” its structure by rationalising it, bringing productivity gains and improving the quality of products (Wyrębek, as above, p.135). This system was introduced as the answer to a practical problem related to the lack of resources. It was created by an engineer in the technology environment which mirrors the way scientific management was brought into existence. It can be said that, without the technology element, lean management would not have adopted the shape for which it is known.

6.5 Time-based management

Time-based management (TBM) is a management concept underlining the strategic importance of time in creating and delivering added value, which enables companies to offer that added value at the appropriate time and also leads to the more efficient development of new products as well as shipping them to the market (Matwiejczuk, 2006, p.125). This approach relates to the requirement for making quick and correct decisions in the

appropriate timeframe. As stressed by K. Zimniewicz, TBM emerged as an answer to the following triggers:

- Changes on the demand side
- Reduction of product life cycles
- Reduction of product development time
- Increased productivity
- Short times of request fulfilment
- Tighter schedules
- Market saturation

Time management is a factor in competitive advantage. As technology advances, the role of TBM grows. Later in the article, the concept of smart factories will be discussed, where decisions are made and executed almost in real time. This is now supported by modern technologies. TBM was not developed because of technological progress, but the further development of the TBM concept is determined by technology.

6.6 Virtual organisation

A virtual organisation is a structure for organising collaboration between organisational units, institutions or individuals undertaken to fulfil a common goal and to achieve larger benefits than by exploring market opportunities in a traditional way (Słupska, 2016, p.143). It is paramount for the members of a virtual organisation to cooperate, display some key competences and modern technology in order to exchange information (Barwik et all, p.81). The view that a virtual organisation is determined by technology is not isolated (Żukowska-Budka, 2006, p.149). For a virtual organisation to exist, it needs at least an internet connection, the appropriate hardware and software for exchanging information. Without the support of technology, the virtual organisation would not function at all.

6.7 Knowledge management

Knowledge management is a capacious concept, and this article will only highlight its connection to technology. As J. Kisielnicki rightly pointed out, it is because of the growth of information technology that knowledge management was established (Kisielnicki, 2004, p.179). That opinion seems to be shared by A. Szpitter, who highlights the wider context of knowledge in an organisational environment. According to her,

even though knowledge was present in all economic systems, it was technology that set it up as a main trigger for the knowledge-based economy and made it the subject of management. She then continues by saying that technology, by placing knowledge at the centre of the economy, pushed capital and labour into the background, confirming that the technosphere dominates the shape of the infosphere and changes its structure (Szpitter, 2013, p.20).

6.8 Contemporary management methods – summary

The summary is presented in the table below.

Table 1-1. Relationship between contemporary management methods and technological progress

Management concept	Description	Relationship with technological progress
Benchmarking	Management by utilising information from a comparison to a chosen standard	Indirect impact – technology as a means to achieve business objectives
Outsourcing	Transition of management function to a third party	Indirect impact – technology as a resource that can be handed over to a third party
Reengineering	Management by redesigning organisational functions into cross-functional teams	**Direct impact** – IT systems create an environment for the method
Lean management	Management by eliminating elements not delivering enough value	**Direct impact** – the concept was developed as the answer to a technical problem
Time-based management	Management considering the strategic role of time	Indirect impact – via emergence of markets dependent on fast decision-making. Technology only facilitates that process.
Virtual organisation	Management facilitated by virtual resources	**Direct impact** – without technology there would be no virtual organisation

Knowledge management	Management considering the strategic role of information and knowledge	**Direct impact** – technology placed knowledge at the centre of the economy and forced its management

Source: own analysis.

The significance of technology in fulfilling management functions is growing (Czupiał, 2008, p.47). Modern companies take advantage of advancements in technology to increase efficiency in order to gain and sustain competitive advantage. At the end of the 20th century, IT systems became an indispensable element of the organisational environment.

7. Challenges for management studies in the era of the fourth industrial revolution

It is widely accepted that the effects of the third revolution are computerisation, production process automation and substantial communication improvement (Michalski, as above, p.9). This served as the direct impulse for the creation of contemporary management methods. Computers (both servers and PCs) transformed into company assets, critical for gathering and processing information. As a consequence of the creation of the World Wide Web (WWW) the organisational external environment changed significantly once again, directly influencing management on every level from strategic to operational. As concluded by C. Dirican, it can be inferred that the fourth industrial revolution forced companies to open their shops online and in the cloud, and to be represented through social media, smartphones and tablets (Dirican, 2015, p.565). Digitalisation, understood as the spread of IT infrastructure (https://sjp.pwn.pl/sjp/cyfryzacja;2553935.html) but also as the replacement of analogue technical systems with digital ones (http://ozkultura.pl/wpis/664/3), allowed for the gathering and processing of information. IT infrastructure became an asset in supporting the management of business operations. Even though the Internet existed, it did not evolve together with personal computers. The very first Internet (ARPANET) was not available to the public. Other networks were also only available to universities. All this meant that sharing information was still conducted mostly via telephone or fax. The symbiosis between the Internet and computers was established by reaching the following milestones:

- **Email** (1872) (Furmanek, 2015, p.19)
- **Modem** (1981) – facilitated the change of the analogue signal of a telephone line into digital, and therefore to Internet networks (http://www.nethistory.info/History%20of%20the%20Internet/netsnmods.html)
- The first **online portal** with news, electronic mail, weather forecast etc. (1985) (https://www.thestreet.com/story/13148737/1/a-short-history-of-aol-from-youve-got-mail-to-verizon.html)

The early Internet was not consolidated and it was not obvious what to look for and where to look for it. That changed in 1989 when Tim Berners-Lee defined the **World Wide Web**. The system consists of:

- Marking each web page (URL)
- Protocol http, allowing for the exchange of text documents on the net
- Protocol html, to create web pages
- A simple browser to request and present data
- Software that would react to requests coming through the net.

The WWW integrated computers with the Internet. It is the thesis of this article that the WWW triggered the fourth revolution – the age of information. The WWW created a reality where information became available to everyone connected to the Internet and computers (including company computers) could be used not just for storing data but also for the exchange of data and information. Access to information here and now enables organisations to build efficient plans and react quicker and more appropriately to external triggers and events.

We are also facing the intensification of the DIKW cycle, the transformation from data, through information and knowledge, to wisdom. This effectively supports knowledge management. Organisations are becoming more aware of the internal and external environment, and it is the acquired knowledge that is the foundation of any organisation as well as an element necessary for building their strategic advantages and credibility (Kowalczyk, Nogalski, 2007). The merger between information and knowledge on one side and technology on the other is reflected in its name – information technology (IT). According to E. and A. Oleksiejczuk, information technologies determine working conditions but also affect all life conditions and growth (Oleksiejczuk, Oleksiejczuk, 2009, p. 57). They also stress that, as information is an integral element of all human activity,

then all processes of individual and collective existence are shaped by technology. Information accessible here and now is, according to this article, the moment where the fourth industrial revolution fully began. It was first recognised in Germany in 2011 as Industrie 4.0 (Hermann, Pentek, Otto, 2015, p.5). Its characteristic trait is the omnipresence of data and information. Technology began to make up the background to all aspects of human existence, where technical devices change its surroundings making access to information constantly possible (Gubbi, Buyya, Marucis, Palanisvami, 2013, p. 1645). The result is a large amount of data that needs to be stored, analysed and seamlessly forwarded. The Internet is evolving into a network of interconnected objects, which not only make use of the information from their surroundings but also interfere with the physical world and use existing technical standards in order to transfer, analyse and utilise data and information (Gubbi, Buyya, Marucis, Palanisvami, as above). The move from the third to the fourth revolution took place by reaching the following milestones:

- **Smartphone** – IBM Simon – 1992 (https://www.thoughtco.com/history-of-smartphones-4096585). Smartphones enable easy access to information for all users.
- **Web browser** – Mosaic – 1993 – previously, only lists of web addresses would exist on more or less random web pages. The browser enabled internet searches (https://history-computer.com/Internet/Conquering/Mosaic.html)
- **Social media** – 1994 – Justin Hall created his first blog. Blogs created a platform for ordinary users to share content as well as to express their opinions and familiarise themselves with the opinions of others. Users did not have to passively consume content any more, but were given an opportunity to become active members of an online community. (http://www.internethistorypodcast.com/2017/06/the-first-blog-justin-hall/). Social media reshaped new approaches to sales and marketing.
- The spread of **RFID** technology – 1999-2003 – (https://www.rfidjournal.com/articles/view?1338/2). RFID is used to identify, track and monitor appropriately marked devices (Hachnel, Burgard, Fox, Fishkin, Philipose, 2004, s. 1115).
- **Tablet** – Lenovo with Windows XP – 2000 – (https://www.businessinsider.com/heres-visual-proof-of-just-how-badly-microsoft-blew-it-with-tablets-2013-5?IR=T). Just like smartphones,

tablets are a means by which to access information anywhere, anytime.

Industry 4.0 marks the beginning of the anastomosis of people and machines. At the beginning of the 21st century, a traditional PC is becoming gradually obsolete as smartphones, smart TVs or smart fridges possess the characteristics of computers. The number and variety of carriers and data relays is continuously growing. Communication is happening between people, people and machines, and between machines. As stated by E. Kwiatkowska, in 2014 machines were party to more than half of all internet connections (Kwiatkowska, 2014, p.60). Data are created by (Hashem, Yaqoob, Anuar, Mokhtar, Gani, Khan, 2015, s. 98):

- Social networks
- Machines (computers, medical devices) – described as the Internet of Things (IoT)
- Networks of sensors
- Transaction data (summarised data example: financial data covering a certain period of time)

Information from the sources above permits a more detailed analysis of customer preferences and habits. The result of that is the possibility of including them in the process of designing and creating products and services. The so-called "smart factory" is becoming a reality, whereby a customer can choose their own configuration from prefabricated modules. Only at that stage would the desired product be assembled and shipped out (Furmanek, 2018, p.62). This effectively means the end of mass production, while a fully automated assembly line would be retained. Goods would be produced on demand as per customer requests. Customer information would be fed into production processes and algorithms would make decisions on further courses of action. As stated in the literature, Industry 4.0 uses information and communication technology for service management and data transfer influencing production processes in real time. It is also said that fast and flexible reaction to customer requirements, together with effective estimation of production cost regardless of a number of scenarios, is a new way to ensure the competitive advantage of an organisation (Kiraga, 2016, p.1604). All of the above amounts to a change in the practice and theory of management with the impact not yet having been researched on an appropriate scale.

As shown in the table below, Industry 4.0 marks the greatest collaboration between humans and machines in recorded history.

Table 1-2. The context of the fourth industrial revolution.

Revolution	Beginning	Known as:	Defining innovation	Characteristics
1	End of the 18th century	The age of steam	Power weaving loom (1784)	Mechanical production enhanced by the power of water and steam
2	End of the 19th century	The age of electricity	Production line (1870)	Mass production facilitated by electrical energy
3	Mid-20th century	The age of computers	Integrated circuit (1969)	Automation of industrial manufacturing, emergence of the service economy
4	Early 21st century	The age of information	WWW (1989)	Internet of Things, Internet of Data, Internet of Services, cloud, Big Data, blockchain, artificial intelligence

Source: Szymanowski, 2018, p.15, adapted by: AR.

On the one hand technology is, as it was during previous revolutions, an object of management. If information has become the most valuable company asset and the volume thereof is growing, then the answer to that challenge is cloud technologies (providing structural backbone for information exchange) and Big Data. According to M. Żabicka-Włodarczyk and W. Tabakow, Big Data includes:

- Databases
- Data processing systems
- Mechanisms for acquiring, storing, processing, visualising and inferencing.

Big Data is, therefore, a tool which supports decision-making. Another new technology that can be used for handling data in the company environment is blockchain, which is a "*transaction database based on a mutual distributed cryptographic ledger shared amongst all nodes participating in a system. It is public in that it is decentralised and shared by all nodes of a system or network*" (Mainelli, Smith, 2015, p.8).

Blockchain can be used as an alternative to a traditional database where data can be stored and shared securely across and networks and users. Its use for business processes was studied by Rimba et al (Rimba et al, 2017). It is claimed (Mearian, 2018) that blockchain will increase the visibility and efficiency of many of them.

On the other hand, technology is becoming a subject of management. As more artificial intelligence (AI) solutions are introduced, the quicker this process will advance. Such solutions are already being used in the banking industry, where an algorithm verifies credit ratings and makes decisions regarding loans and mortgages. The same is happening in advertisement pricing in marketing (Jarrahi, 2018, p.582). Some machines, such as IBM Watson, are able to understand natural language and are equipped with deep learning algorithms. This article does not aim to explain the opportunities offered by AI further, but it is a matter of fact that, with the progress being made in terms of automation, machines play a greater role in decision-making. The fourth industrial revolution is about the abovementioned anastomosis, close cooperation between humans and machines meaning that machines can anticipate human requirements and are able to fulfil them in real time. This is creating a world where humans are becoming dependent on technology. As stated by W. Furmanek, the growing dependence is creating a premise for the fifth revolution – the age of AI, where intelligent robots would actively interact with their surroundings, adapting their actions to conditions and requirements.

The degree of decision-making fulfilled by machines is, at the moment, an open issue. Some scholars believe that the future will bring a world where self-aware machines would release humans from making any relevant decisions (more in: Makridakis, 2016, p.9). Others stress that humans would retain their advantage in the area of strategy and decision making in conditions of uncertainty (Jarrahi, ac above, p.584). Having mentioned those arguments, machines becoming a popular subject in management is bringing with it a challenge that organisation and management theories will need to address. It is necessary to conduct more focused research on the involvement of Industry 4.0 technologies in an organisational environment. It is also vital to verify that, with advances in automation releasing humans from certain organisational activities, that established management theories and methods still correctly describe the quickly changing reality. It can be expected that those theories are universal enough to withstand confrontation with intelligent processes. Automation and mechanisation as phenomena are not new and, as this article shows, have been considered as part of management studies since their inception. Nevertheless, each technological revolution had an impact

on management theories, as also highlighted in this article. Automation has reached the point where certain tasks are carried out better by machines than when otherwise performed by humans. It is therefore only logical that management studies cannot ignore these new developments. In an extreme case, it might be prudent to create a mechanistic theory in management studies describing the human-machine interdependence in management processes and activities. This would constitute an acknowledgement that machines are not in fact a mere object of management theories. One problem is certain, that in order to stay relevant management theory researchers must address the changes described, the quicker the better. As summarised by S. Makridakis (as above, p.5):

- 200 years passed from Newcomen's invention until Ford's innovations
- 90 years passed from the invention of electricity to its wide-scale practical application in manufacturing
- 10 years passed between the creation of the first smartphone and its widespread adoption

The length of time between technological inventions and their subsequent practical use is shrinking. As stated in this article, reactions from management studies as a field of science are triggered by practical challenges. If "the age of AI" ever comes, it might happen sooner than we expect.

8. Conclusions

The goal of this article was to highlight the significance of technological developments in shaping management concepts. It was not the goal of this article to depreciate the role of other factors determining the content and value of management studies, but instead it strives to give technological progress its right place in the aforementioned area.

The technological revolution was an impulse for the creation of basic organisational and management theory. That claim, in light of the presented evidence, appears to be indisputable and is supported in literature. According to J. Beliczyński, scientific management has its roots in both economics and engineering, but Tolleson is of the opinion that the greatest impact on the growth of management as a scientific discipline came from engineers (Beliczyński, 2018, p.39). As pointed out by T. Oleksyn, engineers are the creators of scientific management, and that first management school might as well be called the engineering approach (as

above). As presented by B. Nogalski and P. Niewiadomski, engineering knowledge is of crucial importance for management, including in the present day (Nogalski, Niewiadomski, 2013, s.12). Technological progress was able to exert a clear but uneven influence on different management theories. The details are discussed in the table below.

Table 1-3. The relationship between technological progress and management milestones

Technological progress	Management theory/approach	Relationship between technology growth and management
Neolith revolution – first **division of labour.** 13th century – water and wind as new sources of energy – **first craft workshops**, further enhancements to work processes.	**Pre-scientific period –** management as a practical activity.	Need to provide means for living, making organised activities a necessity.
16th century – with the great geographic explorations – new innovations enabling mechanisation. **1st industrial revolution** – first **factories** using steam power – spread of mechanisation.	**Transition period** – with higher level of work organisation **– first application of scientific approach to management.**	Increased complexity of production created the necessity of examining the production process.
2nd industrial revolution – increased role of transport in supporting the economy, **electricity** in factories, **mass production** lowering production costs, early telecommunications	**Scientific management -** answer to the need for organising and controlling production processes in factories.	Technical innovations brought the expansion of organisation functions which triggered the introduction of management of production processes.
	Administrative theory – the answer to the need to formalise management activities.	Scientific management focusing on increasing efficiency of production did not take into account other aspects of managing

	Behavioural approach – the answer to the need for increasing efficiency of human factors.	more complex organisations.
3rd industrial revolution – creation of computers and technical infrastructure enabling the collection and processing of information. In manufacturing – **automation** by means of IT systems.	**Quantitative approach** – the answer for creating quantitative models of organisation with the aid of computer programmes.	The emergence of computers provided greater possibilities for the use of mathematical models in an organisational environment.
	Systems approach – the answer to the need for understanding the complexity (including interfaces) of organisations processes.	Advancing automation of organisational environment caused increased complexity, and on the other hand created the need to introduce management methods that would better explain that complexity.
	Systems approach – the answer to the need for understanding the complexity of organisations processes.	
	Contemporary approaches – the answer to the digitalisation of organisations, especially the ability to utilise IT systems in management.	Digitalisation and automation brought about the possibility of the wider use of IT systems in support of organisational processes.
4th industrial revolution – application of **IT solutions in every area of human activity**. **Individualised production** using methods of artificial intelligence	**Contemporary approaches** – possible increase of importance of knowledge management, TBM and virtual organisation.	With the rapid growth of IT technologies, the importance of methods facilitating management "here and now" is growing.

	Mechanistic concepts – possible empowerment of machines as participants (and not just tools) of management processes.	The participation of machines in decision-making is growing. It is necessary to research which management aspects are and will be under human control and which will be left for machines to organise, execute and control.

Source: own analysis.

The management theories and methods with a **direct** impact on technological progress are: scientific management, the quantitative approach and the majority of modern concepts (as presented in table 4). **Indirect** impact can be observed in administrative, behavioural, systems and situational theories. A type of pattern can also be recognised. As a consequence of technical revolution, a management approach emerged to address the challenges posed by the revolution. This was the case in terms of scientific management for the second revolution and the quantitative school for the third. As those approaches could not fully explain new organisational conditions, other approaches had to be established to fill in the gaps. For the second revolution, those were administrative and behavioural approaches, and for the third it was the systems and situational ones. The first revolution introduced the scientific method to management. The consequences of the fourth revolution on management theories require further analysis.

As mentioned, the fragmentation of direct vs indirect functions in a triangle: management-technology-economy. The indirect impact of technology on management is exerted via changes in the economic environment. The latter can effectively postpone technical progress and therefore changes in management. The guild system, which did not permit craft workshops for several centuries, is an example. The fall of guild systems coincided with the wide-spread use of machines (Penty, 1922, p.69), which was a decisive factor in the success of craft workshops and later factories. Only when that success was recognised were the first scientific analyses in management conducted.

Another regularity is that, with each revolution, the degree of automation of organisation processes expands. In the pre-scientific period, the work was manual - the next step was the introduction of machines. Subsequently the role of machines in production processes grew and the next machines fulfilled entire processes. One does not need academic

research to realise that, a few steps ahead, machines could be responsible for all organisational processes. If that is to happen then it would change the way organisations are managed. This is the exact reason why it is paramount that this challenge is addressed.

9. Final remarks

The relationship between technology and management has been researched and, as K. Klincewicz confirmed, resulted in defining technological determinism as well as (Klincewicz, as above, p.111-114):

- A position that technology is an independent variable influencing organisational structure and management decisions (C. Perrow)
- A position that technology is a prime variable influencing organisational behaviour (J. Thompson)
- SCOT (social construction of technology) – technologies are the result of interactions between users and physical objects
- ANT (actor-network-theory) – highlighting the equal status of people and physical objects in networks of social dependencies (B. Latour)
- Technology dualism – merging technological determinism with SCOT – technologies are the result of activities conducted by organisational participants, who actively participate in their design and development
- A perspective of organisational choice – different organisations utilise the same technologies in different ways and achieve varied results.

As indicated in this article, the participation of machines in decision making will undoubtedly be greater. The above perspectives were adopted before machines had any critical role in that area. Each of them describes an aspect of the technology-management relationship. However, as noted above, it is still vital to research what Industry 4.0 technologies (especially artificial intelligence) can do to management processes. From this article, it is evident that every breakthrough in technology brings with it changes in the canon of management theories. There is no reason to think that this time will be any different. The three most probable scenarios are:

- Existing theories and methods are universal and it makes no difference whether their subject is a human or a machine;

- Theories and management methods established during the third industrial revolution do not fully address organisational processes in the world of the fourth revolution and therefore their modification is necessary, or a completely different methodology needs to be introduced
- Industry 4.0 technologies (such as AI) eliminate the need for organised human activity in some areas of management.

A result of this new research could be the creation of an approach called mechanistic in the article. This concept, which takes its roots from the ANT approach, could develop towards conceding a role to intelligent machines, not only in process execution but also in the creation of organisational behaviour. The extent of that will be fully determined by further technological progress and the goal of management studies should be providing a framework for those changes.
The consequences of Industry 4.0 technologies in management are a natural research field. The results of that research would help to understand the phenomenon and prepare, to a certain degree, for the age of machines - which can already be seen on the horizon.

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CHAPTER 2

NETWORK RELATIONSHIPS IN ACHIEVING SUSTAINABLE DEVELOPMENT GOALS

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Abstract

The aim of this article is an attempt to present network relationships in terms of achieving the Sustainable Development Goals with special consideration given to the areas of activity of the 2030 Agenda. The 2030 Agenda for Sustainable Development is a framework plan for the world, setting global goals from the perspective of 2030. Its structure includes a set of 17 sustainable development goals adopted by 193 UN member states. The 2030 Agenda is aimed at the formation of a fair world, which is based on respect for the law and rules conducive to social inclusion. In this study, the literary analysis was used as the main research method. This analysis allows the researchers to conclude that the goals of the 2030 Agenda oblige various entities to build network relationships based on close cooperation, aimed at promoting behaviours that allow for economic growth, social development and environmental protection. Its main idea is also the pursuit of development which will guarantee a dignified life for all.

Keywords: network relationships, sustainable development, the 2030 Agenda, Sustainable Development Goals.

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1. Introduction

In the age of technological development and progressing globalisation, the modern world faces new, multi-faceted challenges. Sustainable development, which covers three main aspects, namely social, economic and environmental, deserves special attention. The directions of planning of such activities of a broad scope are usually presented in the form of strategic documents. Rural development is also an important aspect of sustainable development and EU policy, which is reflected in a number of EU strategic documents (Gorb, 2006).

Most countries and international organisations have sustainable development strategies that are usually implemented in the long term. There are set goals and tasks within, thanks to which the idea of sustainable development can be implemented. The implementation of specific goals is possible thanks to the cooperation of many stakeholder groups. An important element of achieving the goals is monitoring based on reliable and objective data, which indicates the degree of implementation and progress in achieving the desired effect. The result of such cooperation is the UN long-term plan for world development known as the 2030 Agenda for Sustainable Development. The assumptions of the development plan cover a wide range of issues, and its implementation was then made possible by the involvement and effective cooperation of various organisations and governments of countries at international, regional and national levels (Prażmo, Wójcik, Żero, 2016). The activities carried out for the implementation of the 2030 Agenda require global partnership and close cooperation, thus building relationships between the above-mentioned organisations (Cygler, Sroka, 2017).

2. Literature review

The importance of sustainable development

Sustainable development is a constitutionally guided principle and concept of management. The principle of sustainable development is systemic. Sustainable development as a category is anchored in axioms and natural law and subordinated to human dignity.

Reflections on the category of sustainable development are currently mainly undertaken by representatives of economic sciences. However, for representatives of management sciences, this category is still a priority challenge in the field of macro-management, which is to ensure the socio-economic order. Taking up this challenge is important because, in the

sustainable development category, there are criteria that ex ante enable one to assess and verify the implemented concepts of development management and avoid unnecessary economic, social and environmental costs on the horizon.

The sustainable development category is a principle and a concept that has been permanently inscribed in the considerations of representatives of various disciplines of science and management practitioners. This category is variously defined and found in many acts of international and Polish law.

Sources of sustainable development can be seen in the management process which, being subordinated to the priority of seeking to maximise profits at all costs, has led to the overexploitation and degradation of the environment and violation of the socio-economic order. The destruction that natural capital was afflicted with has become a contribution to reflection on current development priorities. The sustainable development category was first used during the UN Conference in Stockholm in 1972. At this conference, sustainable and permanent development was not explicitly defined as a category, but in the Stockholm Declaration, provisions referring to the idea of sustainable development can be found[4]. The above-mentioned records show that by 1972, during the meeting of the international body, special attention was already paid to the importance of quality of human life, intergenerational responsibility, and the complementary nature of economic and social development in the process of public management and sustainability, whose interpretation can be found in the works of B. Piontek and F. Piontek: one entity (or one sector, capital) cannot grow at the expense of the other or others (Piontek & Piontek, 2009).

The Brundtland Report, published in 1987, is another document that addresses sustainable development issues. In this report, economic and ecological goals are linked to social goals, and therefore a fair distribution of natural resources. (...) The formula for sustainable development includes the following elements: ecological sustainability, economic development and social justice between generations and within each generation (Kośmicki, 2010). The Brundtland Report stressed the complementarity of the triad of goals: economic, social and environmental, and identified elements of sustainable development, and thus set the framework for managing sustainable and permanent development, but lacked reference to the quality of human life.

[4] Stockholm Declaration. Stockholm Conference Resolution of 14.06.1972 concerning the natural human environment.

From the point of view of building scientific achievements in the field of sustainable and permanent development, another important event was the United Nations Conference on Environment and Development (Earth Summit) in Rio de Janeiro in 1992, at which the Rio Declaration on Environment and Development and Action Programme for the 21st Century Towards Global Sustainable Development (Agenda 21) was approved.[5]

The considerations from the Rio de Janeiro Conference were continued during the World Summit on Sustainable Development in Johannesburg in 2002. In the Johannesburg Declaration, representatives of the global body confirmed their commitment to working towards sustainable development by building a humane, just and sensitive global society, on the assumption that all people have the right to dignity[6]. In addition, the Declaration defines the pillars of sustainable development - economic development, social development and environmental protection, which need to be strengthened at local, national, regional and global level[7].

20 years after the Earth Summit of 1992, in Rio de Janeiro on 20-22 June 2012, the United Nations Conference on Sustainable Development Rio +20 was organised. The following declaration can be found in the final document of this conference: we recognise that the elimination of poverty, change of unsustainable and promoting sustainable consumption and production patterns and protection and management of the natural resource base of economic and social development are the overarching goals and essential requirements of sustainable development[8]. The document also states that the directions of actions under the green policy for sustainable development should promote the patterns of sustainable consumption and production[9].

Another very important document on sustainable development is the New Agenda for Sustainable Development 2030 and its Sustainable Development Goals, which have enormous historical significance for the whole world. It was adopted during the Summit of Sustainable Development, which took place in New York on 25-27 September 2015. In the New Agenda for Sustainable Development 2030, 17 sustainable development goals have been formulated, including the 12th objective of

[5] Rio de Janeiro declaration on the environment and development.
[6] Compare Johannesburg Declaration on sustainable development.
[7] Compare Johannesburg Declaration on sustainable development.
[8] Przyszłość jakiej chcemy. Dokument końcowy Konferencji Narodów Zjednoczonych w sprawie Zrównoważonego Rozwoju Rio +20.
[9] Przyszłość jakiej chcemy. Dokument końcowy Konferencji Narodów Zjednoczonych w sprawie Zrównoważonego Rozwoju Rio +20.

consumption: to ensure sustainable consumption and sustainable production patterns [10].

Sustainable development can be defined as a principle (criterion) or as a concept. If it is understood as a rule, it means that one can talk about the sustainable development of individual sectors of science and practice in which this principle should be respected. Sustainable and permanent development, understood as a concept, cannot be narrowed down to sectors, because individual sectors of science and practice are components thereof. Therefore, sustainable and permanent development should convey to those sectors its detailed criteria which result from the disaggregation of the basic criterion, which is the permanent improvement of the quality of life (Piontek, 2006).

The sustainable and permanent development category has been included in the highest Polish legal act - the Constitution - as the principle and concept of sustainable development. The rank of the principle of sustainable development is underlined by the fact that the legislator has written this principle in the first chapter of the Constitution, which introduces the basic systemic principles of the Republic of Poland. As emphasised by W. Radecki, expression of the concept of sustainable development in legal form is extremely difficult, but the introduction of this principle to the highest-ranking legal act is a determinant for the legislator when establishing general and specific law (Radecki, 1997). In Article 5 of the Constitution, The Republic of Poland safeguards the independence and inviolability of its territory, ensures the freedom and rights of man and citizen and the safety of citizens, guards national heritage and ensures environmental protection, guided by the principle of sustainable development (Sommer, 2005). State functions were listed and it was pointed out that entities of the public sphere should follow the principle of sustainable development when implementing these functions. Another reference to the principle of sustainable development included in the Constitution is the imposition on the state authorities of the obligation to ensure the ecological safety of present and future generations (Article 74 paragraph 1) and prevention of the harmful effects of environmental degradation on people's health (Article 68 paragraph 4). At the same time, it should be emphasised that sustainable development, defined as a systemic principle, is an axiom and essentially means that one entity (or one sector, namely capital) cannot develop at the expense of the other or others (Piontek & Piontek, 2009). This principle has its axiological legitimacy in the preamble of the Constitution, caring for the preservation

[10] The 2030 *Agenda for Sustainable Development.*

of inherent human dignity[11], and also in Article 30 of the Constitution, where it is stated that the inherent and inalienable dignity of man constitutes a source of freedom and human and civil rights. It is inviolable, and respect and protection thereof are the responsibility of public authorities, because in these records one can find reference to human dignity. The principle of sustainable development is therefore of an anthropocentric character, because it treats human beings as having the highest value in the natural world and allows for the realisation of human development. The legislator in the Constitution also defined the systemic conditions for the implementation of the principle of sustainable development, which can include:

- a social market economy based on freedom of economic activity, private property and solidarity, dialogue and cooperation of social partners (Article 20),
- citizens' rights - freedom (article 19), the equality principle (article 32), property rights (article 64), freedom to choose and practice a profession and choose a workplace (article 65), the right to safe working conditions (article 66), the right to health protection (Article 68), and consumer protection (Article 76) (Sommer, 2005).

The social market economy, along with the aforementioned citizens' rights, have the rank of systemic determinants of the principle of sustainable development. Thus, they constitute the foundation for the implementation of this principle, enforced by the highest legal act in Poland.

> Sustainable Development Goals are challenges for the management of the development of the modern world. The 2030 Agenda is a global strategy for sustainable development, aimed at the satisfactory development of individual people, social groups of countries, and some regions of the world, especially those lagging behind in development. The United Nations Agenda for Sustainable Development was adopted in New York at a special United Nations summit in September 2015. The 2030 Agenda contains 17 goals for this development (SDG) and the resulting 169 specific tasks. It is a continuation of the 21 Agenda, containing 21 so-called Millennium Development Goals (MDGs), which were formulated at the UN conference of 2000. The goals implemented in the period from 2000 to 2015 were directed to poorer, developing countries. The cost of the implementation of the MDGs is estimated at approx. 600 billion USD.

[11] Constitution of the Republic of Poland of 02 April 1997 (Journal of Laws of 1997 no. 78, item 483 as later amended.).

> These goals have not been fully implemented, especially in the area of social inequalities, unemployment or over-exploitation of natural resources. According to the UN report, it was possible to reduce the scale of extreme poverty, increase access to clean drinking water and to offer education at the basic level, among others (Gruchelski, Niemczyk, 2016).

The 2030 Agenda covers a 15-year period, i.e. until the year 2030. It has been targeted at all countries and other internal socio-economic policies and at the implementation of the global Paris agreement (December 2015) on the slowing down of climate change. The main part of the 2030 Agenda is contained in the so-called Addis Ababa action plan (from July 2015), which includes tools and measures (resources), both the budgets of individual countries as well as private and assistance funds, transferred for the purposes of supporting the development of poorer countries (ODA - Official Development Assistance). The 2030 Agenda also determines a sustainable and friendly natural environment, management and socio-economic and environmental management systems, regardless of socio-political and economic systems.

The 2030 Agenda includes 17 goals (Table 2-1) in regard to which there is a cause-and-effect relationship, e.g. between employment growth and poverty reduction, or between poverty reduction and the improvement of the natural environment. Additionally, it is worth pointing out that the comprehensiveness and complementarity of the 2030 Agenda can have a direct impact on the degree of achievement of its goals.

Table 2-1. The 17 Sustainable Development Goals

Goals	Areas
C1	Eliminating poverty in all its forms everywhere.
C2	Eliminating hunger, achieving food security and improved nutrition and promoting sustainable agriculture.
C3	Ensuring healthy lives and promoting well-being for all at all ages.
C4	Ensuring inclusive and quality education for all and promoting lifelong learning.
C5	Achieving gender equality and empowering all women and girls.
C6	Ensuring access to water and sanitation through sustainable water management.
C7	Ensuring access to affordable, reliable, sustainable and modern energy for all.

C8	Promoting stable, balanced and inclusive growth, full and productive employment and ensuring decent work for all people.
C9	Building stable infrastructure, promoting sustainable industrialisation and supporting innovation.
C10	Reducing inequality within and among countries.
C11	Making cities and human settlements safe, stable, sustainable and inclusive.
C12	Ensuring sustainable consumption and production patterns.
C13	Taking urgent action to combat climate change and its impacts.
C14	Conserving and sustainably using the oceans, seas and marine resources.
C15	Protecting, restoring and promoting the sustainable use of terrestrial ecosystems, sustainable forest management, combating desertification, restraining and reversing the soil degradation process and halting the loss of biodiversity.
C16	Promoting just, peaceful and inclusive societies, the provision of access to justice for all, and building effective, accountable institutions at all levels.
C17	Strengthening the means of implementing and reviving the global partnership for sustainable development.

Source: Own study based on: UNITED NATIONS.2015. The 2030 Agenda for Sustainable Development. New York 2015 (Internet version, February 2016).

When analysing the above-mentioned goals of the 2030 Agenda, the first two (C1 and C2), which relate to the elimination of poverty and hunger on a global scale, can be considered the most important. (C8 and C9), which guarantee the employment of residents in a modern, innovative industry in conditions of modern infrastructure (Bakonyi, Dzieńdziora, Grabiec, Smolarek, 2011) are also important goals. These goals also guarantee adequate wages and revenues, which should reduce social inequalities (C10).

In the 2030 Agenda, two goals (C6 and C7) refer to minimum living conditions, i.e. access to clean water and sanitation, and access to cheap and clean energy. Assuming that, in the next several years, all inhabitants of the Earth will have access to consumption (including food), Goal 12 of the 2030 Agenda assumes the implementation of sustainable consumption and production, which requires a longer period and, above all, stopping the race among producers of consumption measures in terms of their quantity,

modernity and "gaining market share". The next three goals of the 2030 Agenda concern less measurable socio-political and institutional aspects: (C5) concerns gender equality, (C16) peace and justice and strong institutions, while (C17) deals with a partnership for achieving the abovementioned goals.

The basic condition for the implementation of the 2030 Agenda goals from a global perspective is that all partners (signatories to the 2030 Agenda) have effective institutions and the skills and capabilities in terms of human resources which are necessary to eliminate poverty and ensure sustainable development [12].

The importance of network relationships for achieving the Sustainable Development Goals

The network approach, as a new concept of cooperation between economic entities, was created in the late 1970s as a result of technological changes taking place on the market of enterprises (Business-to-Business, B2B) and increased international competition. It is also widely used in cross-border cooperation through balanced border development, influencing the motivation to strengthen cooperation between cross-border partners. The sustainable development of borders should take into account both social and economic aspects (Kurowska-Pysz, 2016).

The network approach also espouses the importance of the entirety of the company's contacts with the environment, creating multi-entity, complex systems of dependence of relationships and an extensive network of connections. Ground-breaking views in this respect were presented by the IMP Group - Industrial Marketing and Purchasing Group (Ratajczak-Mrozek, 2009). According to D. Barney, a network is a structural condition, thanks to which separate points (often called "nodes" or "node points") are connected with each other by connections (often called "ties"), which are usually multiple and complex, intersecting with each other and occurring in excessive quantities (Barney, 2004). The network understood in this way is of general character and can be a reference point for building various network structures: social, political, economic, IT, etc. A network in the subject literature is also defined as a set of various autonomous organisations that interact directly or indirectly on the basis of one or more

[12] European Commission 2015. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committees of the Regions. Global partnership for the eradication of poverty and sustainable development after 2015. Brussels, on 05.02.2015 (COM 2015 44 final-Internet version, February 2016).

agreements existing between them (De Man, 2004). In general, the network is a loose structure composed of units that multiply values and flexibly adapt to the environment (Domański, Marciniak, 2003). H. Hakanson and I. Snehota define the network as three categories connected with each other: network participants, the resources which they possess, and the actions they take (Hakanson, Snehota, 2005). D. Watts defined four key elements of network understanding: 1. The network has significant strength in the sense that it is counted in billions for people, and in millions for businesses. 2. The network is dispersed in the sense that each entity has only a few hundred links, many times less than the total population. 3. The network is decentralised, i.e. there is no central point to which all or most units would be connected. 4. The network is highly clustered, and in this approach most networks overlap (Watts, 1999).

According to M. Ratajczak-Mrozek, three basic features that prove that a given relationship is a network relationship may be proposed:

- continuous interaction - organisations remaining in a network relationship interact with each other thanks to the existing network of connections (both formal and informal); at the same time, the network relationships between entities mean that any irregularities in any of the relationships will affect other relationships; in addition, the cooperation of entities in the network system allows for the development of a new quality that would not be possible without the network, thanks to the synergy effect; network relationships are usually long-term due to the benefits of network participants;
- interdependence - entities within the network are connected within resources, entities and activities, and interactions within these areas allow for the creation of an added value that would not be possible for individual entities to achieve;
- infinity - you cannot unambiguously and clearly define the boundaries and structure of the network, and infinity is the result of an infinite potential number of direct and indirect relationships between entities (Ratajczak- Mrozek, 2009).

In order to achieve the Sustainable Development Goals, network cooperation between various types of entities is necessary, which - thanks to the synergy effect - will allow for the achievement of the effects which would be impossible without this cooperation. The need for partnership in achieving the Sustainable Development Goals was also highlighted in the 2030 Agenda: we are determined to mobilise the resources needed to

implement this Agenda through a vibrant global partnership for sustainable development, fostering enhanced global solidarity, focusing especially on the needs of the poorest and most vulnerable, with the participation of all countries, all stakeholders and all people[13]. Figure 1 presents entities that, thanks to inter-network cooperation, can contribute to the achievement of the Sustainable Development Goals. The global organisations should include international organisations (including the UN, the WHO) and the High-level Political Forum that holistically coordinates the implementation of the Sustainable Development Goals. The role of statistical agencies in collecting and analysing data, thanks to which it is possible to monitor progress in achieving the goals set out in the 2030 Agenda on an ongoing basis, cannot be overlooked. In order to achieve the Sustainable Development Goals, it is also important to develop national and regional development strategies subordinated to the implementation of these goals, because such action ensures the coherence of planning at various levels and allows for the achievement of the assumed long-term goals.

Therefore, the role of the authorities of individual countries and regional authorities is the management of responsible development, which will be subordinated to the assumptions of the 2030 Agenda. However, the implementation of the Sustainable Development Goals will not be possible without shaping the awareness of citizens who will directly feel the effects of achieving the assumed long-term goals. In the process of shaping the awareness of individuals, a fundamental role is played by educational institutions and research units, shaping the competences of citizens at particular levels of education as well as conducting scientific research and disseminating their results. As mentioned before, the Sustainable Development Goals are an ambitious challenge for the whole world, requiring the implementation of coordinated institutional, economic and social activities on a global scale; therefore, without the cooperation of diversified entities, the implementation of this challenge will be difficult, if not impossible.

[13] The 2030 *Agenda for Sustainable Development.*

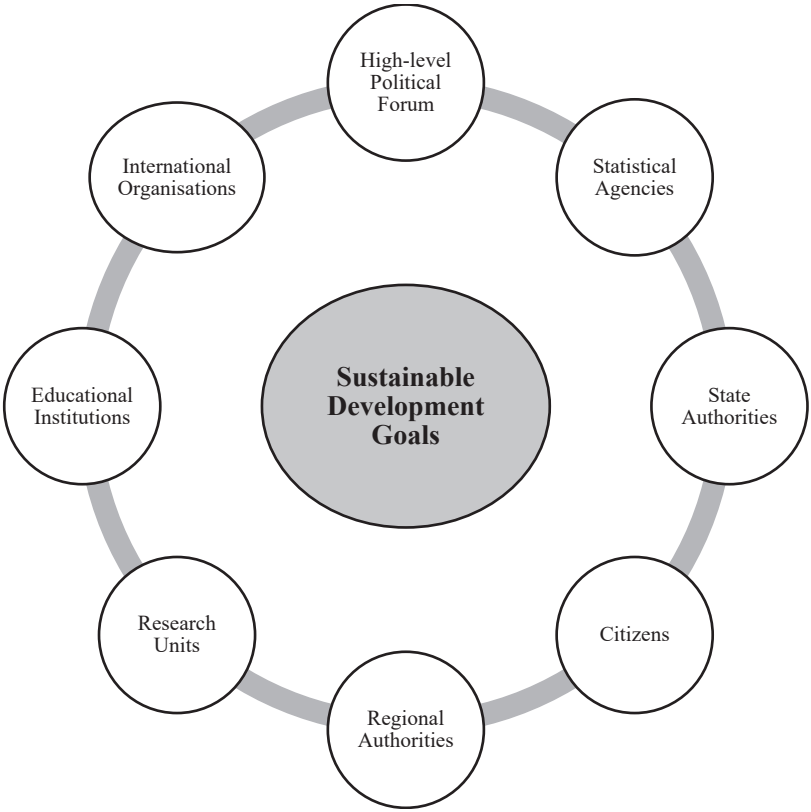

Fig. 2-1. Network relationships in achieving the Sustainable Development Goals.
Source: own study

3. Analysis of the degree of implementation of the Sustainable Development Goals by the European Union countries - research results

In July 2017, the *SDG Index and Dashboards 2017* report was published, which was developed by the Sustainable Development Solutions Network (SDSN) and Bertelsmann Stiftung experts (Sachs, Schmidt-Traub, Kroll, Durand-Delacre, Teksoz, 2017). The report collected publicly available data from 157 countries and assessed what stage of implementation of the Sustainable Development Goals each country was at in 2017. One

of the sections of the *SDG Index and Dashboards 2017* report includes profiles of 157 countries surveyed, containing information on, among other things, the country's place in the ranking, the value of the general indicator measuring the level of the implementation of the Sustainable Development Goals, the assessment of the degree of implementation of the Sustainable Development Goals and the value of indicators, by means of which the degree of implementation of these goals was determined.

The authors of the report describe in detail the methodology of their research, and particular attention should be paid to the precise selection of the data for the report, which had to meet the following criteria:

Global significance of the data and their application to the conditions of individual countries' selected indicators were important for monitoring the achievements in terms of the implementation of the Sustainable Development Goals and were applied in all or almost all countries; this data had to be comparable on an international scale, so that it was possible to determine the implementation thresholds of the Sustainable Development Goals:

1. Statistical adequacy - data were collected and statistically processed in a credible and reliable manner;
2. Timeliness - data sets must be published without delay and be available for recent years;
3. Data quality - data had to be the best source of information on a given topic and come from national or international sources (e.g. from national statistical offices, intergovernmental organisations) or other reliable sources;
4. Coverage - data must be available for at least 80% of 149 UN Member States with a population of more than one million (Sachs, Schmidt-Traub, Kroll, Durand-Delacre, Teksoz, 2017).

The requirements specified in the report allow us to conclude that the study prepared by experts is characterised by high reliability and credibility.

In the *SDG Index and Dashboards 2017* report, the degree of implementation of each of the Sustainable Development Goals was marked with four colours:

- green - the goal has been achieved,
- yellow and orange - there are significant challenges in achieving the goal,
- red - serious barriers to achieving the goal must be eliminated (Sachs, Schmidt-Traub, Kroll, Durand-Delacre, Teksoz, 2017).

Within each Sustainable Development Goal, indicators have been defined for various aspects that have an impact on the achievement of these goals and have been measured. In order to determine the degree of implementation of a given goal and assign it to the appropriate colour marking, the authors of the report defined the ranges of values of these indicators. However, colour markings were assigned not only to the Sustainable Development Goals, but also to individual indicators. Thanks to this process, it is possible to determine not only whether a given Sustainable Development Goal was achieved, but also to indicate to what extent individual indicators for this goal are implemented.

Based on the data contained in the *SDG Index and Dashboards 2017* report, the level of the implementation of the Sustainable Development Goals of the European Union countries was assessed, the results of which are presented in Table 2-2.

Table 2-2. The analysis of the level of implementation of the Sustainable Development Goals by countries of the European Union

Country	SDG Global Rank	SDG Index	The level of implementation of the Sustainable Development Goals																	In total			
			G 1	G 2	G 3	G 4	G 5	G 6	G 7	G 8	G 9	G 10	G 11	G 12	G 13	G 14	G 15	G 16	G 17				
Austria	7	81.4																		1	9	4	2
Belgium	12	80.0																		1	8	5	3
Bulgaria	40	72.5																		2	4	8	3
Croatia	24	76.9																		1	8	7	1
Cyprus	50	70.6																		2	7	3	5
Czech Republic	5	81.9																		1	4	10	1
Denmark	2	84.2																		6	6	2	3
Estonia	15	78.6																		2	4	6	5
Finland	3	84.0																		5	6	3	3
France	10	80.3																		1	6	8	2
Greece	38	72.9																		0	1	11	5

Spain	25	76.8																			0	5	6	6
Holland	13	79.9																			2	5	6	4
Ireland	19	77.9																			2	6	4	5
Lithuania	36	73.6																			1	5	9	2
Luxembourg	33	75.0																			1	6	5	4
Latvia	32	75.2																			0	5	8	4
Malta	22	77.0																			2	9	3	3
Germany	6	81.7																			3	5	6	3
Poland	27	75.8																			1	4	8	4
Portugal	28	75.6																			2	3	7	5
Romania	35	74.1																			2	5	8	2
Slovakia	23	76.9																			1	4	7	4
Slovenia	9	80.5																			2	7	4	4
Sweden	1	85.6																			7	4	3	3
Hungary	18	78.0																			1	3	9	3
Great Britain	16	78.3																			2	4	6	5
Italy	30	75.5																			0	6	6	5
Total																								
			19	0	5	4	0	3	4	0	5	6	2	0	0	0	1	0	2					
			7	3	12	19	8	24	12	9	5	10	20	0	3	1	5	8	3					
			2	22	8	5	19	1	10	12	11	12	6	8	3	6	13	16	18					
			0	3	3	0	1	0	2	7	7	0	0	20	22	16	9	4	5					

Source: own study on the basis of Sachs, J., Schmidt-Traub, Kroll, Durand-Delacre, and Teksoz, (2017): SDG Index and Dashboards Report 2017. New York: Bertelsmann Stiftung and Sustainable Development Solutions Network (SDSN).

Analysing the places taken by European Union countries in the SDG Index ranking, it should be stated that the first three places among the 157 countries surveyed were occupied by Sweden (1st place, SDG Index 85.6), Denmark (2nd place, SDG Index 84.2) and Finland (3rd place, SDG Index 84.0). The lowest places in the ranking were occupied by the following EU countries: Greece (38th place, SDG Index 72.9), Bulgaria (40th place, SDG Index 72.5) and Cyprus (50th place, SDG Index 70.6). The value of the SDG Index determines the extent to which a given country has achieved the Sustainable Development Goals, e.g. Sweden's SDG Index rating of 85.6 means that 85.6% of these goals have been achieved.

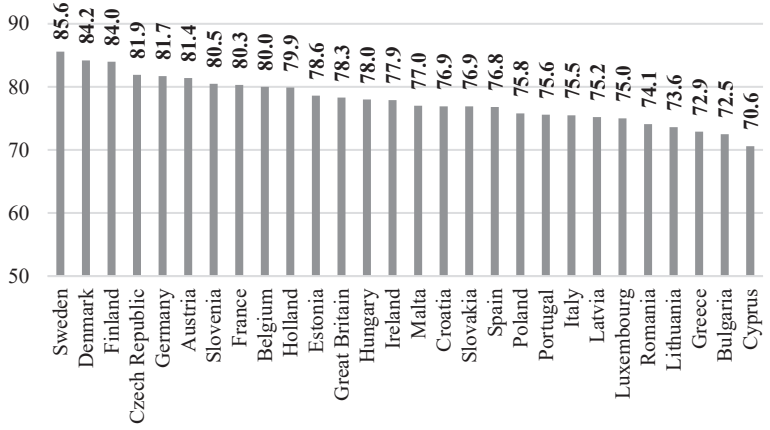

Fig. 2-2. SDG Index of the EU countries
Source: own study on the basis of Sachs, J., Schmidt-Traub, G., Kroll, C., Durand-Delacre, D. and Teksoz, K. (2017): SDG Index and Dashboards Report 2017. New York: Bertelsmann Stiftung and Sustainable Development Solutions Network (SDSN)

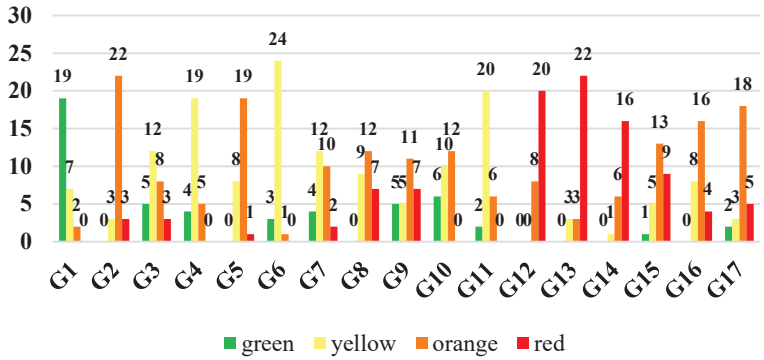

Fig. 2-3. The degree of implementation of the Sustainable Development Goals by the EU countries
Source: own study based on Sachs, Schmidt-Traub, Kroll, Durand-Delacre, and Teksoz, (2017): SDG Index and Dashboards Report 2017. New York: Bertelsmann Stiftung and Sustainable Development Solutions Network (SDSN).

When assessing the degree of implementation of the Sustainable Development Goals by EU countries, it can be observed that the greatest problems occur with the following goals:

- Goal 12: Ensuring patterns of sustainable consumption and production,
- Goal 13: Taking urgent action to combat climate change and its consequences,
- Goal 14: Protecting oceans, seas and marine resources and using them sustainably.

In the case of Goal 12 - concerning sustainable consumption and production - in as many as 20 countries it is necessary to eliminate major barriers to achieving the goal, and in six countries the implementation of this goal is a significant challenge. It is worth noting that even countries occupying the top three places in the ranking (Sweden, Denmark and Finland) have serious problems with ensuring patterns of sustainable consumption and production. The reason for this may be widespread consumerism and overexploitation of the natural environment, because, as indicated earlier, EU countries also have serious problems in achieving climate change goals and protecting oceans, marine waters and their resources.

The analysis of the progress of EU countries in achieving the Sustainable Development Goals made it possible to observe that the majority of countries - 19 out of 28 - have already achieved Goal 1 to eradicate poverty, and progress towards meeting Goal 6 on access to water and sanitation should be assessed positively. However, one must be aware of the fact that the path to achieving the Sustainable Development Goals is still very long and requires comprehensive, decisive actions on a global scale, so that in 2030 all or a large majority of the assumed goals are achieved.

4. Conclusions

The Sustainable Development Goals (SDGs) will be an indispensable platform for building a better world. The various concepts that lie behind this ambitious agenda will together provide the engine for progress – the need for a defined vision, the importance of multistakeholder partnerships, the emphasis on accountability and measurement, and the acknowledgement that environmental, social and economic goals are interconnected. The very exercise of setting goals fulfils various functions. The definition clarifies what we are working towards, creating a sense of purpose around which different constituencies can cohere (Sachs, Schmidt-Traub, Kroll, Durand-Delacre, Teksoz, 2017):

1) Every country faces major challenges in achieving the SDGs
2) Poor countries need help to achieve the SDGs
3) The universal SDG agenda contains important spillover effects
4) Countries should usefully benchmark themselves against their peers as well as against the goal thresholds
5) Countries and international agencies need to make substantial investments in statistical capacity to track the SDGs (Sachs, Schmidt-Traub, Kroll, Durand-Delacre, Teksoz, 2017).

The SDGs rightly emphasise a universal agenda that requires all countries – both rich and poor alike – to take decisive actions to support sustainable development. In this year's report we note that the development patterns of the rich countries may generate adverse "spillovers" that may hinder the ability of poorer countries to achieve the SDGs. For example, the high consumption levels, banking secrecy and tax havens, and weapons exports by rich countries may severely inhibit sustainable development in poorer and more vulnerable countries. On the other hand, international development finance by high-income donor

nations also directly supports the SDGs. Many of the adverse spillovers tend to be neglected or poorly measured in official development statistics. The 2017 SDG Index and Dashboards therefore review the scientific and policy literature to identify the best available data for quantifying such complex spillovers. We show that there are indeed many such adverse global spillovers to consider and that they are driven strongly by high-income countries. We believe that such adverse spillovers deserve much greater attention by national and international efforts to achieve the SDGs and by statistical agencies. We know that our report is only a start on such analyses and should be understood in that spirit. The SDG Index and Dashboards show that the data on important SDG priorities are sometimes unavailable, out of date or not yet counted on the official list of indicators. Filling these gaps and ensuring that key measures are included among the official indicators will require improved metrics as well as more and better data. One priority for SDG implementation must therefore be to invest in strengthening data collection, the choice of indicators, and statistical capacity in all countries.

The 2017 SDG Index and Dashboards report generates "tough grading" for all countries, including the richest ones. We have chosen this approach not to be punitive or pessimistic about the prospects for dramatic improvements, but to draw attention to the most urgent SDG-related challenges facing each country in terms of each SDG. We hope that, in addition to governments, other SDG stakeholders will find this report interesting and useful. Business, civil society organisations, foundations, universities, the media, and others will all play a vital role in turning the SDGs into practical tools for explaining sustainable development, managing implementation, ensuring accountability, and reporting on progress at local, national, regional, and global levels (Sachs, Schmidt-Traub, Kroll, Durand-Delacre, Teksoz, 2017).

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Joanna Dzieńdziora, Magdalena Wróbel and Dawid Żebrak conceived and undertook the literature review. Magdalena Wróbel conceived and designed the metrics of the research, and undertook data collection and analysis. Joanna Dzieńdziora and Dawid Żebrak wrote the theoretical part of the paper, and Magdalena Wróbel and Dawid Żebrak wrote the empirical and discussion parts of the paper.

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CHAPTER 3

DEVELOPMENT OF BUSINESS MODELS AND THEIR KEY COMPONENTS IN THE CONTEXT OF CYBER-PHYSICAL PRODUCTION SYSTEMS IN INDUSTRY 4.0

BOŻENA GAJDZIK[1]

Introduction

The development of cyber-physical production systems (CPPS) is associated with the popularisation of the concept of Industry 4.0, which was publicised after the Hanover Fair (2011) as Industrie 4.0 (Zühlke, online). A large number of scientific publications and research reports on Industry 4.0 are already available. There is no one universal definition of Industry 4.0, and the scope of changes in individual publications describing Industry 4.0 is varied. It is assumed that Industry 4.0 is a product of the fourth industrial revolution with a vision of intelligent factories built of intelligent cyber-physical systems (Lasi et al., 2014). Production in Industry 4.0 is carried out by industrial robots with intelligent computers using the Internet to control and communicate, and to integrate all processes inside and outside the enterprise within the supply chain using all possible technical solutions to connect the virtual world and the real world. Systems - CPPS - are structures combining information technology (IT) and operational technology (OT). CPPS are integrated into communication solutions known as the Internet of Things (IoT) and Internet of Services (IoS). The development of systems inside the enterprise leads to smart factories with machine learning, cloud computing and Big Data, solutions which lead to the optimisation of

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performance and competitive advantage. The production technology used in Industry 4.0 is described as Advanced Manufacturing due to the automatic search for and implementation of the best solutions for manufacturing products using the existing resources of the company and taking into account the customer's personalised needs (Hermann et al., 2015). The processes of equipment (machine) communication are carried out by means of cloud computing as a data storage and processing set. Computers control production using data and digital product description. The smart factory is a virtual (digital) copy of the real world that uses the Internet of Things (IoT) (e. g. Chui et al., 2010; Ashton, 2009; Barciński 2016; Kaliczyńska and Dąbek, 2015). Inside the smart factory there is autonomous transport of raw materials and products, and the level of inventories is supplemented on an ongoing basis with the use of intelligent storage solutions (e.g. smart shelves) and computer systems. Production at the smart factory can be entirely without, or with minimal levels of, employee participation. New environments for business − Industry 4.0 − support the creation of new business models and opportunities. These new opportunities are based on integration of the two main flows involved in a manufacturing process. “They are (i) information flows, represented by the (big) data coming from the production systems and other machines/systems involved in the overall manufacturing value chain, and (ii) physical flows such as the movements of materials used or created during the production process” (Kunal Suri et al, 2017).

This very general description of production in Industry 4.0 was only an introduction to the presentation and understanding of the development of business models in cyber-physical production systems. The analysis of business models is step-by-step in cyber-physical systems. The methodology of the research procedure included three blocks, namely: (i) presenting changes in business models in cyber-physical systems in Industry 4.0, (ii) presenting components of business models, and (iii) presenting the final form of the business model in CPPS. The first block (the chapter in this publication) was defined as the development of business models in CPPS. This part of the publication was based on a literature study on Industry 4.0 and CPPS. The information collected on the functioning of CPPS was the basis for the evolution of the business model development path in Industry 4.0. The second block presents the business model structures described in scientific studies in the context of CPPS and Industry 4.0. This block (chapter) was called: Business model components - BMC. The hybrid business model in the new environment of Industry 4.0 was built from the key components of evolving and changing business models in the direction

of CPPS. The hybrid business model in CPPS is the third block in this publication.

1. Development of business models in CPPS

1.1 Business models for CPPS: general characteristics

The colloquial model is a pattern of action or product type. In precise terms, this is the mode of operation of an economic entity, with the displaying of first-class characteristics, mapping its activities, which results in the value offered to the customer. The essence of each model is therefore the value that clients receive as well as the value of the company. Business models are a mapping of methods adopted by enterprises in the course of delivering value to the market. Enterprises in this activity increase and use resources so that the products offered to customers have a greater value than the products of the competition. Business models are treated as a way to achieve a competitive advantage by establishing a group of product recipients and ways to create value. Business models are a combination of company strategy and manufacturing technology in the construction of the value chain, allowing for effective operation and renewal of resources and skills (Osterwalder and Pigneur, 2010; Casadesus-Masanell and Ricart, 2011). The value of the product is evaluated by the recipients in given conditions, and the unique value builds customer loyalty towards producers and a strong advantage on the producers' market.

Along with changes in the conditions of running a business, models themselves are changing. Individual models may be more or less stable over the period considered. The source (beginning) of values in business models are innovations (Johnson, 2010; Teece, 2010), understood very broadly as a result of material and non-material investments of enterprises. Innovations arise as a reaction of companies to the diverse demands placed on their environment. They can be a form of passive (after time) or active (pre-emptive) reaction. Innovations can be more or less new, more or less complex, more or less original, and more or less creative. Each company has a business model (or several), most often similar to those seen throughout the industry. Companies rarely work solely on one type of model. Usually it is most beneficial to develop a model that is a combination of various aspects of building a competitive advantage. The fundamental transformation of industry is underway - Revolution 4.0 - Industry 4.0. CCS will be dominant under the conditions of the newly created reality.

CPS means the integration of computational and physical processes (Lee, 2006 Törngren, 2015 b). Several keywords may be distinguished in the CPS descriptions: integrated physical processes, embedded, networking, IT systems, IoT, Industrie 4.0 etc. (Törngren, 2015a). Wang et al. (2015) presents the following definition: CPS are "embedded computers and networks which monitor and control the physical processes, usually with feedback loops where physical processes affect computations and vice versa." On a more technical level, CPS means embedded computational systems equipped with network capabilities. Embedded systems are major drivers of innovation for current high-tech products (Lee and Seshia 2015; Lee, 2006; Lee et al., 2015; Wang et al., 2015). CPS are part of a globally connected world where products, devices and objects interact beyond classical application boundaries and form the IoT, data and services. These are systems embedded in network systems created by individual partners (network actors) (Åkeson, 2016). These systems are increasingly connected with each other to merge the physical world and cyberspace. Supported by sensors, these systems obtain information from their physical surroundings and provide them to internet services, which in turn can directly affect the physical world by means of actuators (Lee, Bagheri and Kao, 2015). The use of cyber-physical systems (CPS) in production systems is referred to as Cyber-Physical Production Systems (CPPS) or Smart Factory (Rudtsch et al., 2014 on the basis of: Geisberger and Broy, 2012). Individual products, production resources and processes are individually characterised by special features of CPS. The business potential of production networks and the network industry with decentralised coordination is enormous.

Lee (2006) began by defining CPS as: "*integrations of computational with physical processes"*; subsequently, Lee et al. (2015) presented the CPS architecture for Industry 4.0-based manufacturing and the implementation of CPS into the factory. The new architecture of business models is called *5C architecture* by its authors. These 5C are: smart connection, data-to-information conversion, cyber, cognition and configuration. The description of individual components can be found in Lee et al. (2015). To make it easier to remember individual elements of CPS, they are presented in Figure 3-1.

The use of CPPS in Industry 4.0 is a critical innovation. The breakthrough in terms of innovation results from a wide range of technological changes, which are replacing human labour. Production lines are created by robots that communicate with each other and with people and learn through data access. The use of manufacturing robots in production took place earlier (at the end of the 20th century), but only now has a huge leap been made in terms of their application in enterprises;

although new solutions require large financial outlays, it is assumed that in the global economy it is no longer possible to hold back the tide.

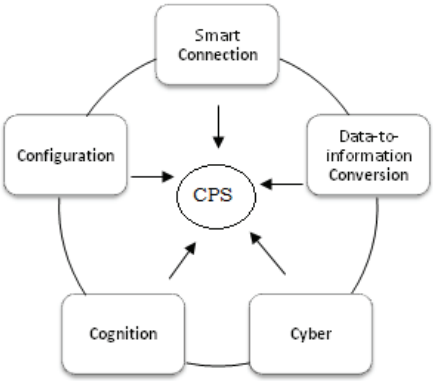

Fig. 3-1. *5C* architecture of the business model for CPS − an overview of the system
Source: Prepared on the basis of: Lee et al. (2015).

CPS systems ensure data collection, processing and impact on physical processes occurring within the entire production network due to unlimited network connections with intelligent equipment (learning machines, manufacturing robots, intelligent computers etc.), that communicate with each other with minimal human participation required, and only then in a supervisory or coordinator capacity when it comes to particular functions in production. Each of these factors is recognised as a source of system success. Industry 4.0 introduces new areas of competitiveness known as "smart" to business. Competitiveness in new business models means modern materials for personalised products produced by CPPS, new quality of the products and new services characterised by such features as accuracy, speed, precision, availability, individuality, convenience, ease, flexibility, uniqueness, adaptation, intelligence etc.

1.2 Description of the business model in CPPS: step by step

The development of business models based on CPPS is presented in the next figures (in the chapter). Figure 2 illustrates the concept of the CPPS in a very general way, based on the collision of two worlds: virtual and real, which became the basis for the creation and operation of the analysed systems (CPPS). The new business model is "pushed in" between the real

and virtual worlds, which have found widespread application in Industry 4.0. The business models created are a form of business mapping realised using the technology of two worlds: real and physical. Models created at this stage of knowledge of cyber-physical systems are based on publicly available information describing the key features (advantages, pluses) of CPPS, and hence the sources of competitive advantage of enterprises acceding to the implementation of typical technology (required) for Industry 4.0. The authors of particular business models may not have detailed practical knowledge due to the short period of time from the popularisation of the concept of Industry 4.0 (the Industrie 4.0 presentation by the German government at the Hanover Fair at the beginning of 2011) to the implementation of CPPS in enterprises.

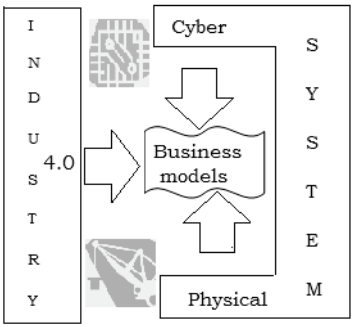

Fig. 3-2. The place of business models in Industry 4.0
Source: own study.

The development of business models in Industry 4.0 is related to the development of CPS. Cyber-physical production systems (CPPS) are gradually being implemented in enterprises from various industries. Enterprises start with several devices that create specific cyber-physical discharges in the current production system. Over time, there are an increasing number of islands inside the enterprise, and entire production lines are connected to each other. From the perspective of 2020 and later, the development of CPPS is foreseen, understood as an increase in the number of enterprises in particular industries from smart production. However, the development of smart factories is expected by 2030. This forecast applies to highly developed countries; in other countries the time required to set up a smart factory is longer. Thinking from such a perspective, it can be assumed that the details of business models in the context of CPPS will take place in the period from 2020 to 2030, which

will be the period of the "Intelligent Enterprise" (Nanterme and Daugherty, 2017). Figure 3-3 illustrates the concept of a business model in the context of the CPPS, when an increasing number of enterprises will reach the level of smart production. CPPS will be implemented in many different sectors of the economy, such as cars, footwear, clothing, home furnishings, steel construction, medicine, energy, etc. In some sectors, the recipient of the product is an individual customer (natural person), e.g. footwear chains; in others, an institutional customer (business entity), e.g. the steel industry. Personalised products and services, which at the current stage of CPPS development are not available to an individual customer, e.g. personalised medicine (currently new products are only available to hospitals in many countries), will in time be at the "fingertips" of every customer.

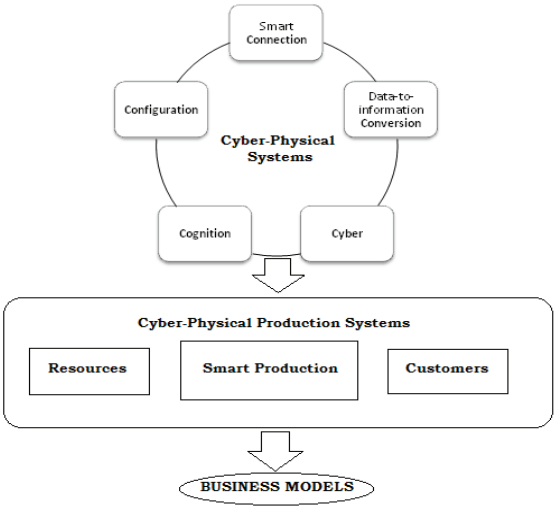

Fig. 3-3. The place of business models in CPPS
Source: own study based on: Lee et al. (2015).

In order to create a concept of highly detailed business models of enterprises operating in Industry 4.0, more information (to build knowledge) about the value chain of enterprises from smart production should be obtained. The value in Industry 4.0 is personalised, i.e. determined by the experience created at a given time by a single consumer who initiates the production process and participates in the product design (casting). The product offered by the company is a proposal for the customer who participates in its modification, adapting to their

expectations, while at the same time obtaining satisfaction derived from the fact that he will receive a product that meets his expectations. The value is based on the physical characteristics of customers and their image of the product. The customer is an active participant in CPPS (Korena et al., 2015). The structure of the classical value chain developed by Porter (1985) is subject to evolution in CPPS. The existing system of connections within the value chain of Porter (1985) allowed for the systematisation of business activities aimed at creating more value for the customer. Porter's value chain, as a sum of nine strategically significant activities in the company creating added value of its business activity: five basic activities that are directly related to logistics, production and sales, and four auxiliary (additional) activities including management, financial and personnel services, research and development and supply, will lose its transparency. With the development of CPPS, knowledge of the evolution of the chain in enterprises arises due to the impact of computer science and automation on the course of manufacturing and other business processes. The share of individual auxiliary and support activities in creating value for the client will change. The value is personalised and strongly individualised; therefore, the competitiveness of enterprises will be related to technological possibilities in terms of meeting customer requirements. The value chain will be subject to configuration depending on the degree of adaptation of entities to the requirements of Industry 4.0 participants. The value chain in Industry 4.0 is varied in terms of products. Its participants focus on the needs of a virtual customer using IoT (Kagermann Henning, Wahlster and Helbig, eds., 2011). Satisfying every customer's need is a prerequisite for competitiveness in business models. The individual customer orders carried out through personalised products create a set of serviced clients that exceeds hundreds of millions. The created set of satisfied individual customer needs is treated as a form of mass individualisation due to overcoming spatial, temporal, communication, technological, cultural, and financial barriers, etc. (Blaik, 2018). The value chain created by cyber-physical systems is the result of IT and OT. New technology creates new value for the customer. Figure 3-4 illustrates the concept of the business model in the context of CPPS in the value chain.

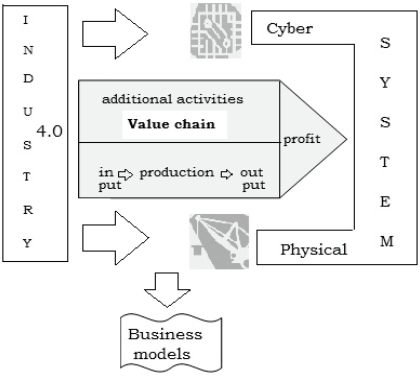

Fig. 3-4. The place of business models in CPPS in the context of the value chain
Source: own study.

The development of Industry 4.0 is also the development of the compilation of cyber-physical systems in the supply chain. Companies serving customers in the value chain are integrated horizontally (a wide range of cooperation of entities), and cooperation between participants is highly flexible (in order to meet all the expectations of a single customer at a given time). The supply chain assumes that the supply of products, services and competences is multi-entity (Rudtsch et al., 2014). Horizontal integration through value networks is a term used in production, automation and high technology and means the integration of various IT systems used in various stages of production and planning, including the flow of materials, energy and information both inside the company and outside in value networks (Domingo Galindo, 2016; Bauernhansl, Hompel and Vogel-Henser, 2014). In the Industry 4.0 concept, horizontal integration is based on digitisation, thanks to which information flows in the network from the customer to the supplier and vice versa. Participants in the supply chain have access to cloud computing, which facilitates their adaptation of supply and warehouse processes in connection with maintaining inventories, production processes, distribution and supply to the personalised expectations of the ordering party (Kisperska-Moroń & Krzyżaniak, 2009). The flow of information between all links in the supply chain is optimised. Participants use solutions forming IoT (Tadejko, 2015) in the cyber-physical supply chain, and virtual links are prioritised ahead of physical connections. The synergy effect in the supply chain is achieved when the cyber-physical systems of individual participants in the supply chain are matched with compatible IT and

computer solutions, and are therefore flexible and communicative (Geisberger and Broy, 2012). Figure 3-5 illustrates the concept of the business model in CPPS in the context of the supply chain.

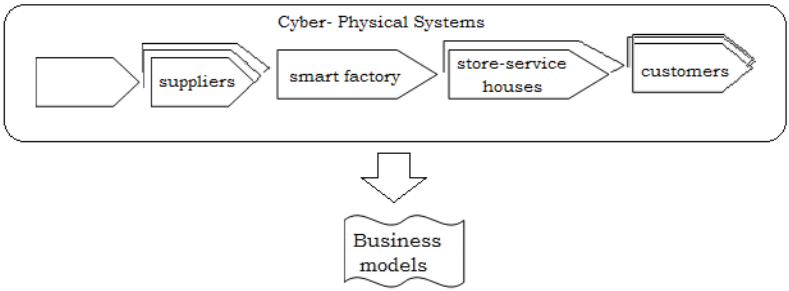

Fig. 3-5. The place of business models in CPPS in the context of the supply chain
Source: own study.

2. Business model components – BMC in CPPS

2.1 BMC in literature review: general characteristics

When reviewing the literature, there were two modules of the methodology of developing business models in the context of CPPS. The first module collects patterns of established business models and analyses their applicability in the context of the CPPS. The second module develops business models as models for the CPPS and is the basis for their further development. Rudtsch et al. (2014) used such a two-tier division of methodical proceedings. The authors reviewed the essence (basics) of the models described in publications by the following authors: Boulton et al. (2000), Linder and Cantrell (2000), Voelpel et al. (2004), and Osterwalder et al. (2005), and stated that innovation and technology are the basis for developing business models. The literature presents many proposals for the division of business models that have been created over the years, which were and are built on the basis of various criteria, e.g. taking into account the market relations of entities: Business-to-Customer, Business-to-Business, Customer-to-Customer, and Mobile Commerce. Business model components - BMC - are presented in two layouts: the external model and the internal model. Such a division was used by Osterwalder and Pigneur (2013). The Business Model Canvas in the enterprise – the external model − consists of the following: customer segments, value

proposition, channels, customer relationships, and revenue streams. The internal model is created by blocks such as key resources, key activities, and key partnerships. Additionally, some specific methodologies exist for selected branches, technologies or topics. In summary, existing approaches for business model generation are mostly universal and generic, whereas specific approaches focus on selected areas (e.g. e-Business). V. Rudtsch et al. (2014) claim that "for the complex area of CPPS a comprehensive approach for developing business models is missing". The authors undertaking the determination of new components of business models in the context of CPPS emphasise the importance of value created in networks (value creation networks). Moreover, a successful and competitive business model requires a smart combination of patterns. Issues of risk assessment are important contents of the publication in terms of the adaptation of enterprises to the requirements of functioning at CPS, which are considered in three layouts: internal, external and cooperation risks. Without going into the details of individual risk categories that apply to enterprises in the context of CPPS operation, the authors formulated a conclusion on the need to take business risk into account in the context of CPPS development and the creation of a smart factory. In network structures with Cyber-Physical Systems new players, new services and new risks arise (Törngren, 2015). The risk arises from the new customer, new customer needs and new supplier relationships in CPPS or in smart factories. The new structure of the value chain is called the Smart Value Chain Risk. New business models are a compromise between technology development and economic value creation (Chesbrough and Rosenbloom, 2002). The modified value chain is made up of smart entities. The new structure of the business model will ultimately be based on Smart Factory to Smart Factory relations, which means that fully automated production lines will communicate and coordinate production, which in turn will lead to a situation in which consumers will be able to order increasingly personalised products. This is the realisation of the idea of "mass customisation" through massive individualisation (Götz and Gracel, 2017; Szymańska, Adamczak and Cyplik, 2017). CPPS are a challenge for various sectors of the economy: manufacturing, automotive, energy, medicine etc. (Acatech, 2011). Every industry, and even every enterprise, must recognise the barriers to CPPS creation and develop a strategy for implementing a new technology that connects the real world with the virtual world. The new environment creates new challenges for managers in smart production and in network organisation (Sroka and Gajdzik 2015). Enterprises entering the new reality of CPS bear high investment costs, and network systems based on CPS represent a new challenge for

them. Barriers that occur, not only financial ones but also personnel (e.g. high demand for IT specialists, operators, analysts, etc.), organisational (e.g. compatibility of information systems of partners in the network, ensuring control over robots and web technology) and many others must be included in the internal business models of individual partners and in the entire delivery model.

2.2 BMC in CPPS: key components

In new business models adapted to CPPS due to the large number of participants in the customer service process, where products are part of CPPS, a hybrid value is created. Hybrid value creation can be defined as "the process of generating additional value by innovatively combining products (tangible component) and services (intangible component)" (Terrenghi, Schwarz and Legner, 2018; Velamuri, Neyer and Moeslin, 2011). In Industry 4.0, hybrid value is made up of smart products and the Internet of Things (Turber and Smiela, 2014). The third component of the business model in the context of smart values is data (Big Data) (e.g. Oks et al., 2017). The data create new possibilities for businesses to create value in new innovative ways, and thus transform existing business models; these data are made possible through CPS (Brettel et al. 2014; Kolberg and Zühlke 2015; Herterich et al. 2015). In CPPS there are more data, and new types of data, which is available in real-time. Data open up new innovative ways of creating the value realised in smart products (Åkeson, 2016, based on: Osterwalder & Pigneur, 2013). Hybrid value is a combination of products and services as solutions that address specific customer needs by means of data utilisation (Velamuri et al., 2011). The literature review revealed that the value of information is found in four main areas of data utilisation: monitoring, remote controlling, optimisation, and automatisation (Heppelmann and Porter 2014). Based on the study by Terrenghi et al. (point: 2.2. *Hybrid Value Creation in Cyber-Physical Systems*, 2018 citation for: Velamuri et al., 2011) one can propose a value system as a key component in business models in CPPS (Figure 3-6).

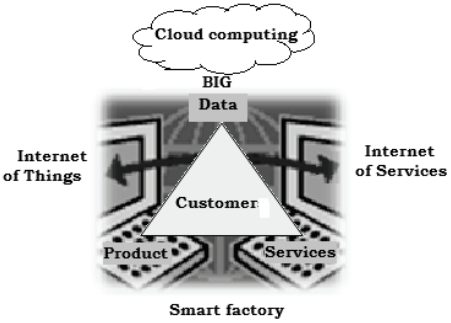

Fig. 3-6. Hybrid value in business models in CPPS
Source: own study based on: Terrenghi et al. (2018).

In CPS, partnerships are key to finding the components (products, services, and data) to combine in a solution that addresses specific customer needs, so when it comes to interactive value, it may be said that "CPS did have an indirect impact on business models i.e. through expected changes in customer relationships and distribution channels, but foremost, through changes regarding specialisation and partnerships" (Linus Åkeson, 2016). In CPS, interactive value creation is intended as the forms of open and personalised collaboration between value creation partners (i.e. actors or networks of actors (Lusch and Nambisan 2015)). Interactive value is created by the integration of participants in the supply chain (at various levels of cooperation) (Windahl and Lakemond, 2006) and using the IoT (Turber and Smiela 2014). In CPS, more entities cooperate to increase the value of the common customer (Bujak, 2017). The scope of cooperation between the participants in the supply chain, which results in the value of Storbacka et al. (2015), is called "Value Co-Creation", and new business models are "Business Models for Value Co-Creation". The market in Industry 4.0 is more complex in terms of the number of participants, forms of cooperation, coverage, and channels, which requires the flexible cooperation of partners on the industrial market (manufacturing market). In a computerised and IT society, the effectiveness of cooperation between partners (actors in a network) depends on the value of information (Linus Åkeson, 2016). Access to information and the efficiency and effectiveness of information management creates opportunities for new cyber-physical business models (Figure 3-7). The cyber-physical supply chain does not count data so much as raw facts, processed data, which is useful information that is used to improve the chain (Sroka, Cygler and Gajdzik, 2014). Furthermore, with digitalisation and Industry 4.0, the manufacturing

industry aims to minimise time-to-market and maximise customisation. The ambition of enterprises is to meet the requirements of their customers, and digital solutions enable them to deliver higher value to the customer segment.

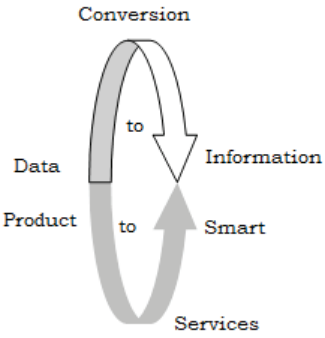

Fig. 3-7. Hybrid value in co-creation business models in CPPS
Source: own study based on: (Linus Åkeson, 2016)

Based on the literature study and the 5C architecture of the business model in the context of CPS (Figure 1) (presented by Lee et al., 2015), proposed on the basis of prudent 6C considerations, the sixth is customisation (Figure 3-8).

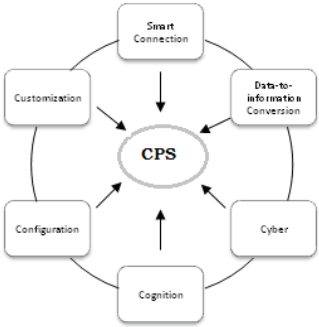

Fig. 3-8. 6C architecture of business models in CPPS
Source: own study based on: Lee et al. (2015)

3. Hybrid business model in CPS: key components

Based on the literature review carried out, the author states that there is no single universal business model in the context of applying it to CPPS in Industry 4.0. In order to achieve a consensus, the author proposes a hybrid model that consists of the components of creating expanded (extended) value in the entire value chain, which is made possible using digital solutions and advanced technology that are related to Industry 4.0. The structure (architecture) of hybrid business models in CPS consists of information, specialisation, customisation, partnerships, and servitisation (Figure 3-9), which are entwined thus: IoT, IoS and CPS.

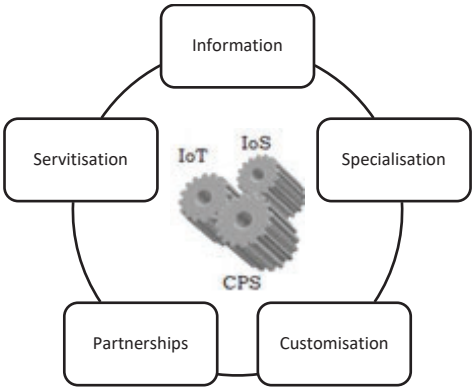

Fig. 3-9. Hybrid business model of CPPS: key components
Source: own study based on: Linus Åkeson 2016

Characteristics of particular components of the business model (more information in: Linus Åkeson 2016):

- Information as a processed form of data, which in the new reality is more accessible through the use of sensors and other solutions providing information from devices and products for cloud computing. The data collected (Big Data) are subject to analysis and re-use to improve business. Individual devices use data to optimise activities. The process of improving activities in CPS takes place with minimal participation of people and the maximum level of independent devices (latest-generation robots).
- Specialisation as a segment activity for a specific customer. Phole et al. (2005) state that there are three phases of external specialisation:

an internally integrated firm, strategic partnerships, and industry networks. Moreover, they also described three stages of internal specialisation. These three phases are as follows: the different business units are optimised, followed by an optimisation of the processes, and finally the whole enterprise is optimised with a centralisation of finance, IT and HR functions and a customer-oriented company. Phole et al. (2005) also state that an internal specialised firm is closer to a service-dominant logic.

- Customisation as products created on request and in accordance with customer expectations, as well as its psychophysical features. Customers are participants in the product design process, including through the use of 3D printers and plastic mass to create the product (prototype or final product). The possibilities of cyber-physical systems are so vast that it is difficult to describe them in a few words in the context of meeting customer expectations. Modern technologies produce clothing and footwear taking into account the physical characteristics of customers, select medications for a particular patient, manufacture products from new materials (e.g. clothes which change colour), create new distribution channels (e.g. the delivery of small-sized products with drones), etc. The development of information exchange infrastructure and production technology results in the fact that the production of products that once was unprofitable or even impossible becomes reality – the long tail strategy. Digital end-to-end engineering across the entire value chain enables integration of the product manufacturing process with the process of its development and modification. Development based on digital modelling allows you to take every aspect of customer requirements into account at every stage of implementation, and linking the CPS production system with the digital product description allows you to flexibly adapt the entire implementation process, from product planning to production planning, the development of manufacturing technology to production and service (Iwański and Gracel, 2016).
- Partnerships in the supply chain with cyber-physical systems will be more complicated than they are now, as the relationship between partners will be replaced with cyber-physical systems (Voelpel, Leibold, Eden, 2004). Links between partners and competitors are more flexible in CPS. In cyber-physical reality, coopetition (Cygler, Gajdzik and Sroka, 2014) and trust (Gajdzik and Grzybowska 2012) are strengthening.

- Servitisation, i.e. access to a wide range of services, services targeted at smart factory support as well as customer service in the pursuit of minimum time to reach the market and maximum customisation. New models cannot exist without services. Services have been and are an important component of business models (more information about the role of services in Vargo and Lusch (2008) (the authors present nine key aspects of service-dominant logic)). Service orientation in CPPS consists of offering the best of its specialty services in the network to implement a given fragment of the manufacturing process, and servitisation means ensuring the continuous and trouble-free operation of devices. Prevention maintenance by using product memory is essential in the servitisation of equipment (Grzybowska and Gajdzik, 2012; Herterich et al., 2015).

The presented components of business models in CPS do not exhaust the subject under consideration, but only constitute an introduction to further discussion, due to the fact that it is impossible to precisely understand the functioning of CPPS complexes on a global scale without their implementation; now that these forms are implemented in enterprises, over time, they will create a value chain that will be a global space.

Summary

The content contained in this chapter extends the knowledge of business models in CPPS. Based on the literature study and the presented scientific concept, the path of business models in CPPS was created. The resulting library can be extended by further scientific papers dedicated to business models in CPPS. The new reality - Industry 4.0 - which has already emerged in highly developed countries results in the need to create a business concept that can meet new challenges. Every attempt to describe a business in terms of the new realities is a valuable resource of knowledge for enterprises in countries with a lower level of development. The author of this chapter presented a way of developing business models in CPPS from the perspective of the country of origin (Poland). Knowledge of Industry 4.0 is reaching Poland gradually, and CPPS are created in foreign enterprises whose branches are located in Poland, e.g. Bosch and the automotive industry. The detailing of business model structures and application options for models will appear with the development of CPPS not only in Germany, the USA, Japan or China, but also in other countries around the world.

Conclusions:

- at the present stage of CPPS development there are no universal business models,
- the business models being built are an attempt to combine aspects of the virtual world with the real world in CPPS,
- business models in CPPS are hybrid models, built of several components that (in the opinion of individual authors) best reflect the relationships of partners in the supply chain with cyber-physical technologies.

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CHAPTER 4

MATURITY OF RELATIONAL SALES AND CUSTOMER SERVICE IN THE INNOVATIVE ENTERPRISES SECTOR: THE BASIS FOR CONSTRUCTING A BUSINESS MODEL

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Introduction

Contemporary sales are significantly different from those a few decades ago which mainly consisted of making a purchase transaction. In the past, it was associated with sitting and waiting for the customer at the point of sale, while the new approach to sales is based on a more active approach and on building customer relationships. Meeting the expectations of customers, direct sales, sales based on identifying customer needs, and online sales are terms that should increasingly be the basis for the functioning of contemporary organisations. The main purpose of the purchase is to satisfy customers that they would gladly return to the enterprise in order to take advantage of commercial services once again. It should be emphasised that the sales do not necessarily involve forcing the product to be purchased and should not be associated with intrusive activity on the part of the seller. Therefore, it must be a complex process; if these sales are initiated by learning about the needs of a potential client, there is a high probability of completing the transaction with great success.

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The biggest triumph in the relational process is re-sales and customer returns. Therefore, effective sales are a permanent process that begins with determining the most important customer needs to the full satisfaction of the customer in the form of a purchase. Sales skills are not only a feature of sellers but, in the competitive environment, are just as important as the skills related to maintaining and establishing interpersonal contacts. The aim of the chapter is to present the elements of innovative enterprises achieving maturity in the relational sales process and defining the stages of this process as the basis for constructing a business model based on relational sales in the contemporary enterprise.

1. Customer service and customer experience in current business models

Customer service is a very wide range of activities that are largely used in sales. In particular, it is important in relational sales, because it allows you to keep existing customers and form new relationships with potential buyers. The subject of customer service and its experience is very extensive. Specifically, customer service involves understanding and perceiving what he/she feels, what he/she thinks, how he/she reacts and what the potential customer experience is - it is the process of building a relationship with a client that is usually long-lasting and built on a partnership based on customer - seller relations [Report, 2009, p. 7-10]. Customer service, from the perspective of the customer, must become something special and unforgettable for him/her. This is much more than a good impression or a nice attitude. The customer must feel honoured and positively surprised. Fulfilling his/her needs must be done in such a way that the customer feels that the seller is not just an ordinary seller but that he/she distinguishes the customer with professionalism and interest. Professional customer service depends on constantly surprising customers and gaining their trust during even the smallest contact, while at the same time creating a positive experience for the buyer. Customer service means all kinds of activities that the seller takes to satisfy the customer and gain his/her trust. All these activities have a significant impact on increasing the value of the client's relationship with the seller [Zemke, 2005, p. 9].

It is necessary to highlight a few elementary sales facts of the contemporary customer service market. First of all, today's customers have much less time than before, so if the seller does not gain their trust and if they do not meet their needs, potential buyers will go to a competitor that will quickly take advantage of the situation and satisfy their desires. Secondly, it has been known for a long time that acquiring new customers

is much more difficult than maintaining existing ones. Unfortunately, a large number of companies, not realising this fact, are interested only in maximising current sales, without thinking about what will happen later - if they had devoted more attention to existing customers, their results so far would have significantly improved [Futrell, 2004, p. 472]. Thirdly, the contemporary client is increasingly demanding and stressed; therefore, he/she expects polite, nice and cultural customer service, based on a smile and absolute adaptation to his/her shopping conditions.

Generally speaking, the role of customer service is to satisfy clients' needs throughout the purchase process [Oloruntoba and Gray, 2009, p. 487]. Excellent customer service is a service that makes a positive and long-lasting impression and is much more than a simple courtesy. It also means to go beyond their expectations in such a way that the organisation is recognised as one which is worth doing business with. Excellent customer service means to look for unusual and unexpected ways of pleasing customers and surprising them, so they maintain only a positive experience with the organisation [Wereda and Grzybowska, 2014, p. 192].

Customer service is strictly connected with customer experience, which is a process of interactions between an organisation and a customer over the duration of their relationship. These interactions include a customer's attraction, awareness, discovery, cultivation, and advocacy along with the purchase of goods and use of services. It is measured by an individual's experience during all points of contact against his/her expectations [www.sas.com, 2019].

Moreover, enterprises should introduce Customer Experience Management (CEM) strategies to their practice. CEM is the science of knowing your customers as completely as possible. Such knowledge can create and deliver personalised experiences that will not only make them be loyal to the organisation, but also advertise its offer to others. This positive word-of-mouth was considered in various research papers by McColl-Kennedy and Smith [2006], Bernhardt and Kennett [2000], and Piercy [1995] as the most valuable form of effective marketing for any organisation.

Generally, customer service covers all kinds of actions taken by a seller to satisfy a customer. All these activities greatly influence the value of the customer's relationship with the seller. Services provided by the seller to the customer in order to meet their expectations include, but are not limited to, credits, guarantees, invoices, packaging, product availability, delivery, claims etc. [Futrell, 2004, p. 472]. If the customer returns to the point of sale and still has confidence in the seller, then the organisation can conclude that it has a professional approach to customers. Many

organisations note that today's customers have much less time than they used to, so if the seller does not earn their trust quickly, potential buyers will go to the competition [Baird and Gonzalez-Wertz, 2011, p. 20]. Still, a large number of enterprises are interested in maximising current sales without thinking about what will happen next. If they paid more attention to their customers, the existing results would improve significantly [Williams and Naumann, 2011, p, 25].

It should be noted that all changes created internally by organisations, for example through innovation, must be supported by customers, because creating a competitive advantage is the result of many variables. An important element for the organisation is generating profits through increasing sales while creating a positive experience, added value and professional customer service from the buyer's point of view. It should be emphasised that customer service must take place in every organisation and, at all times, should mainly serve to create a new business model which is difficult to copy, based on professional communication, excellent customer service, creating value for the enterprise and its stakeholders, and building relationships, as well as trust through appropriate interactions between the company and the client. Selected definitions of the business model are presented in Table 4-1.

Table 4-1. Selected definitions of the business model

Author	Definition
Timmers [1998]	The business model defines the structure of the product, service and information flow, and contains the specification of the so-called business actors along with their roles and description of potential benefits they relate to.
Obłój [2002]	The business model appears as a "combination of the company's strategic concept and technology of its practical implementation, understood as building a value chain that allows for effective operation and renewal of resources and skills".
Magretta [2002]	A business model is a description of how resources are combined and transformed to generate value for stakeholders and how the organisation will be rewarded by stakeholders for the values provided to them.
Osterwalder and Pigneur [2002]	The business model is an offer of organisational values for specific customer groups and the organisation's architecture indicating the generation of beneficial and sustainable income streams.
Afuah [2004]	The business model is a set of activities, methods and time to carry them out, and the resources used for this - to give the client a benefit, and to provide a profit.

Casadesus-Masanell and Ricart [2010]	The business model is an indication of how the organisation creates value for clients and captures part of this value in the form of income.
Amit and Zott [2010]	The business model is the essence of managing transactions in such a way as to create value by taking advantage of business opportunities.
Teece [2010]	The business model is the logic of creating and delivering value to customers and creating relationships with these clients.
Laudon and Traver [2012]	The business model should meet a number of conditions, and especially provide customers with unique values. The business model changes, evolving over time, so it should be easy to redefine, but difficult to copy or imitate. The key elements affecting business models are: value proposition, revenue model, market entry, competition, competitive advantage, market strategy, organisational development and the management team.

Source: own work.

The business model presented by the authors assumes that each innovative enterprise should create value innovation for stakeholders (mainly including customers) and apply appropriate relational sales techniques, including professional customer service, to ensure a continuous inflow of revenue streams.

2. Relational sales in improving contemporary organisations

In the contemporary hyper-competitive atmosphere, enterprises attempt to keep their current customers by providing different selling techniques, to improve their performance, to attract new customers and to establish long-term relations with them. Unfortunately, classic marketing theories mainly pertained to transactions and placed no importance on maintaining customers. Due to expanding competition and the maturity of many markets along with continuous changes in the environment and the diversity of the population, enterprises are confronted with the reality that they are not faced with a growing economic system and markets as before [Emani, 2015, p. 648]. The results of research indicate that the cost of attracting new customers is five times more than retaining existing ones. Enterprises have found that losing one customer is something more significant than losing a sales item. It means losing the entire flow of sales by that customer during the time he/she has been a customer of the enterprise [Kotler, 2004]. According to the literature, relational selling has a background in relational marketing. According to many authors, relational selling focuses on behaviours designed to create mutually beneficial long-term relationships between the buyer and the salesperson

which is the main basis of relationship marketing (Tab. 4-2). In addition to many of the behaviours employed in transactional selling, relational selling requires the salesperson to devote greater attention to behaviours designed to develop trust and add value over the long run. These behaviours include trust building, listening, problem identification, and problem solving [Avila et al., 2006, pp. 1-2].

Table 4-2. Selected definitions of relationship marketing

Author	Definition
Berry [1997]	Relationship marketing is creating, maintaining and enriching customer relations. Acquiring a new customer is only the first step in the marketing process.
Gronroos [1990]	Relationship marketing means creating, maintaining and enriching relationships with clients and their partners in such a way that the goals of both parties are achieved through mutual exchange and the fulfilment of promises made.
Copulsky and Wolf [1990]	Relationship marketing is the process of creating a database of already existing and potential clients and getting closer to them with the help of diverse, specific information for each of the buyers. An analysis of the costs of acquiring and maintaining each client as well as long-term assessments of relationships should be carried out.
Cram [1994]	Relationship marketing is the consistent application of updated knowledge about individual clients to design a product / service that is communicated interactively to develop and maintain mutually beneficial relationships.
Morgan and Hunt [1994]	Relationship marketing applies to any marketing activity aimed at establishing, maintaining and deepening beneficial mutual exchange.
Tzokas and Saren [1996]	Relationship marketing is a process of planning, developing and nurturing a climate of bonds that promotes dialogue between the company and its clients. It will result in instilling mutual understanding and trust as well as respecting the possibilities of each party in line with their roles established on the market and in society.
Kotler [2004]	Relationship marketing builds strong economic, technical and social ties between the parties, which reduces transaction costs and saves time. Usually, concluding transactions is then never negotiated at any time and becomes the subject of routine action.
Payne [1997]	Relationship marketing increases mutual dependence and strengthens cooperation between exchange partners over a long period of time.
Harker [1999]	This author has compiled various definitions of relationship marketing in seven categories: 1. Creation (attracting new customers, creating and establishing bonds); 2. Development (strengthening, deepening ties); 3. Maintenance (upholding, stabilisation, duration of ties); 4. Interaction (exchange of values, mutual exchange, cooperation); 5. Long period (long-lasting, lasting bond); 6. Emotional content (attachment, trust, promise); 7. Result (profitable, effective, mutually beneficial maintenance of bonds).

Rydel and Ronkowski [1995]	Relationship marketing means the concept of management and operation on the market, according to which the market effectiveness of companies depends on establishing partner relations with market participants. This concept assumes the construction of loyalty relationships with clients and strategic alliances with business partners.
Fonfara [1999]	The concept of relationship marketing puts emphasis on the management process, i.e. creating, developing and maintaining the company's links with other entities. It exposes the direct, interactive, bi- and multilateral nature of contacts between the seller and the buyer as well as other entities in the process of creating and delivering products and services. In addition, it emphasises the lasting nature of the links between exchange partners. Creating and maintaining these connections requires time, effort and money.
Rogozinski [1998]	Relationship marketing means the mobilisation of staff aimed at making the buyer not only a co-creator of the value of the product but to tie him/her permanently to the company. The author's approach is different and the author himself stresses that the definition grows out of the marketing spirit, exposing the key importance of customer service, and hence staff who should have a specific impact on the client and develop a lasting relationship between the buyer and the company.
Furtak [2003]	Relationship marketing means the concept of management and operations on the market, according to which the company's market success depends on establishing partnerships and long-term relations with market participants.

Source: own work.

Relational marketing has a broader meaning than relational selling. which is one of its basic elements. Relational selling is strictly connected with professional customer service, communication, trust and sales practice. The era of relational selling has brought a new meaning to sales encounters. According to Ingram, Inks, and Mabie [1994], relational selling is directed toward achieving mutually satisfying results for both the buyer and seller, which sustain and enhance future interactions. What is more, the long-term aspect of relational selling requires salespeople to pay greater attention to customer satisfaction, ongoing customer service, and providing information of value [Callahan, 1992, p. 30]. There are two goals of relational selling: first, strong relationships help protect the selling organisation from losing customers. The belief is that customers will not be as easily lured away by lower-priced competitive offerings. In addition, buying organisations will have greater tolerance for infrequent mistakes. Second, the improvement of profitability by reducing costs associated with selling; in addition to the lower cost required to maintain an existing customer than to acquire a new one, selling organisations may realise cost reductions from efficiencies generated through open communication, cooperation, and information sharing between principals in both the

buying and selling organisations [Avila et al., 2006, p. 2]. For example, Jolson [1997] claims that relational selling is "the building of mutual trust within the buyer/seller dyad [to] create long-term relationships, alliances and collaborative arrangements with customers, mainly based on perfect selling techniques and professional customer service". In order to obtain goals for relational selling, a model has been presented in the chapter that incorporates building trust and credibility in the opinion of the customer (f1), proper identification of the needs of the customer (f2), excellent presentation of a product or service by the seller (f3), confirmation of the sales process or closing of sales (f4), the involvement of the seller in the sales process (f5), engaging the client in the co-design and co-implementation of the product/service (f6), the intensity of the contact with customers (f7), and the quick resolution of customer problems or complaints (f8) as building blocks for a successful selling (sales) maturity process (Fig. 4-1).

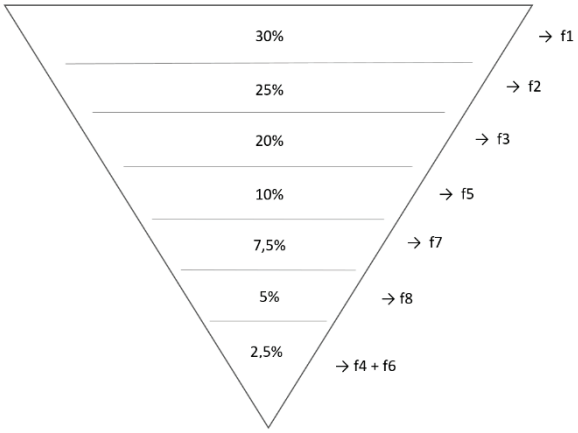

Fig. 4-1. Relational sales model in a contemporary innovative enterprise based on building customer relationships
Source: own work.

Relational selling requires these elements, and involves knowing the customer, providing professional customer service and other elements to satisfy customer needs while building mutually beneficial relationships. According to many studies, other factors include showing appreciation, building friendships, inviting the customers "in-house," asking questions, performing research, and getting to know the customer as a person. These and other elements of relational selling provide a means to more profitable,

sincere, and solid business relationships with customers [Chambers and Asher, 1992]. According to our own research, some techniques of relational sales have been stated that can be used by an enterprise to develop maturity in selling.

Table 4-3. Relational sales techniques used in innovative enterprises

Type of technique	Description of the action
Value for the customer	• Lowering prices to the limit for regular customers; • Creating bonuses for customers with the highest bills and organising lotteries with prizes for them; • Rewarding loyal customers with free packages of services / products depending on the period of cooperation; • Creating customer culture as part of VIP clients.
High quality of products / services	• Certifying and maintaining the quality of products / services; • Completing the offered promotions; • Introducing innovative products / services at affordable prices for regular customers.
Correct communication with the client	• Improvement and ongoing updating of databases; • Wider sources of information about the client; • A larger range of data on the client; • Enriching customer interaction; • Creating the possibility of interaction between permanent clients and a new client (e.g. recommendations); • The use of social media in the process of communication with the client.
Segmentation and purposeful selection	• Concentration on the target market, which will grow with the company and create long-term relationships and generate profits; • Adaptation of the offer to a specific group of recipients.
Personal promotion tools	• Creating applications of individual promotional tools for existing clients; • The use of electronic media in the process of promoting products / services.
Professional customer service	• Creating a positive customer experience through solid and professional service based on the professionalism and knowledge of sellers.
Personnel policy and internal marketing	• Well-developed motivation path; • Enriching and developing communication between the employee and the company; • Authorization given to employees • to represent the company among customers; • Creating a closer relationship with the company and creating greater involvement in communication with the client among employees.

Special loyalty programmes	• Creating various forms of loyalty programmes (e.g. club of loyal clients); • Applying the client rating among acquired and existing clients.
Building a partnership with a client	• Building partnerships among clients, • Creating a customer retention index on an ongoing basis; • Shortening the cycle of introducing product / service innovations by involving the customer in the development of new products; • Flexible response to the needs of buyers (related to the assortment, quantity and delivery time) depending on market fluctuations.
Creating trust and credibility in the sales process	• The seller always shows interest in the customer's problem; • The seller is a professional in what he does and does not judge the work of others; • The seller understands and satisfies the needs of customers. • The seller shows empathy, credibility in action and competence.
After-sales care	• the seller listens to complaints and treats the client as a sales partner; • The seller anticipates customers' concerns; • Rapid processing of complaints, exchanges or return of goods; • Keeping the customer informed about the status of his/her order, even if it was done on the Internet.

Source: own work based on: [Wereda, 2009, p. 187].

When it comes to customer value issues, it can be assumed that creating additional value for the buyer will ultimately also lead to benefits for the enterprise. For the customer, apart from the price, the high quality of services, the use of personal promotion tools or special loyalty programmes play an increasingly significant role. An obvious matter in customer service is a satisfied employee who is a direct representative of the company in relations between the enterprise and the client; therefore, personnel policy, a well-developed motivation path and the implementation of personnel marketing affect the efficiency of the entire staff. In every contemporary organisation, it is increasingly said that acquiring a new client is several times more expensive than maintaining the current one. This more or less means that building customer relationships is often much more important than selling alone. The most important thing is the building of trust and the credibility of the client in the sales and after-sales process, which is why a lot of attention has recently been paid to the development of these skills by sellers (Table 4-3). Thus, the notion of relational sales covers the entire long-term process based on various techniques, often starting well before meeting with a potential client and continuing throughout, even when the customer discontinues the relationship with the company. Every organisation should strive for maturity in relation to relational sales, and then maintain it at a professional level.

3. Maturity of relational selling and customer service in innovative enterprises–research study

The importance of relational sales and customer service in innovative enterprises can have an impact on shaping business models aimed at developing relationships with stakeholders and creating value for them. Nowadays, enterprises are looking for development paths in terms of satisfying the needs of customers, as well as creating new needs. Therefore, paying particular attention to the aspect of customer relations (from the perspective of their service, with particular focus on the maturity of sales processes) can be considered an important component of improving business models today.

The scope of the research therefore concerns the development of correct and effective relations with clients, mainly through the implementation of principles of relational sales and customer service. The location of customer relations is also an important problem area of consideration in the chapter in terms of shaping the business model for innovative enterprises.

The subjective scope of the research pertains to innovative enterprises operating on the NewConnect market in Poland. The study included 100 enterprises (25.3% of the population as a whole, which comprised 396 companies from Poland[3]). In addition, the majority of enterprises surveyed conduct their core business in the trade (16 entities) and financial services sectors (15 entities), as well as building & construction, new technologies and e-commerce (eight entities each), and media and computer science (seven entities each) (Table 4-4).

Table 4-4. Leading business profiles of enterprises (*N*=100)

Leading business profile	Number of enterprises
Trade	16
Financial services	15
Building & construction	8
New technologies	8
E-commerce	8
Media	7
Computer science	7
Eco-energy	5
Eco-production	5
Production	5
Health protection	5
Telecommunications	3
Leisure and tourism	3
Real estate	3
Recycling	2

Source: own work.

[3] Data current as of July 2018 [New Connect Statistic Bulletin, p. 1].

The study used random systematic selection (taking into account the criterion of the leading activity profile indicated for the purposes of NewConnect market records) in the layers (corresponding to the size of the enterprise). Respondents were executive managers or managers (top- or mid-level) responsible for the area of relations with the environment or innovations, or operational employees (the lowest level) employed in enterprises listed on the NewConnect market (one respondent from each enterprise).

The test sample is described in detail in Table 4-5.

Table 4-5. Criteria for description of the research sample (*N*=100)

Size of the enterprise			
Micro	Small	Medium	Big
0	40	31	29

Scale of the enterprise's operation				
Local	Regional	Domestic	European	International
6	1	24	38	31

Revenue for the year (net)					
PLN 0-10m	PLN 10-20m	PLN 20-30m	PLN 30-50m	PLN 50-100m	More than PLN 100m
37	17	9	8	11	18

Respondent's position in the enterprise		
Top-level management	Mid-level management	Lowest level of management
52	23	25

Age of the enterprise				
Very young (1-3 years)	Young (4-6years)	Mature (7-15 years)	Old (16-24 years)	Very old (25< years)
1	0	8	48	43

Source: own work.

The empirical study was conducted in June-July 2018 and covered the entire country (16 provinces in Poland). The largest number of enterprises surveyed were based in the following provinces: Mazowieckie and Łódzkie (16 entities each), Śląskie (14 entities) and Wielkopolskie (12 entities).

The survey tool was a CATI questionnaire (*Computer-Assisted Telephone Interviewing*), in which respondents assessed the degree of compliance with customer service activities and the implementation of the basic principles of relational sales on a 5-point scale. The results of the k-th question (k = 1 ... 14) given by the nth respondent (n = 1 ... 100) were subjected to statistical analysis including factor analysis. The calculations were carried out using software IBM SPSS Statistics 24 (PS IMAGO 4.0).

The study also employed a method of critical analysis of literature, as well as methods of analysis, synthesis and induction.

The main goal of the study is to show how innovative enterprises operating on the NewConnect market approach shaping and maintaining relationships with clients (mainly in the scope of relational sales and customer service). The research problem is as follows: what is the level of maturity of relational sales and complexity of customer service in innovative enterprises operating in Poland (on the NewConnect market) and what is the direction and strength of dependence between the maturity of relationship sales and the complexity of customer service?

Three hypotheses were evaluated to achieve the goal of the study:

- **Hypothesis No. 1:** Relational sales in innovative enterprises have a high level of maturity.
- **Hypothesis No. 2:** Customer service in innovative enterprises has a high degree of complexity.
- **Hypothesis No. 3:** The higher the level of maturity of relational sales, the higher the level of complexity of customer service in innovative enterprises.

In order to verify Hypotheses 1 and 2, two composite indexes were constructed:

- **Relational Selling Maturity Index–RSMI,**
- **Customer Service Complexity Index–CSCI.**

In order to answer the above problem, the methodology of constructing both indicators, referring to specific partial factors (Table 7 and Table 12), will be presented. These factors (as specific generalisations of various activities and processes) have been specified on the basis of the analysis of the current literature on the subject, addressing the problem of shaping the principles of relationship sales and customer service [Mussol, Aurier and de Lanauze, 2019], [Emani, 2015], [Tuk, Verlegh, Smidts and Wigboldus, 2009], [Avila et al., 2006], [Johnson, Friend and Malshe, 2016], [Smith and Deuerling, 1997], [Ogilvie, Agnihotri, Rapp and Trainor, 2018], [Shannahan, Bush, Shannahan and Moncrief, 2017], [Virtanen, Parvinen and Rollins, 2015], [Wood, Johnson, Boles and Barksdale, 2014], [Benmoyal-Bouzaglo and Boissinot, 2014].

The composite ratios of RSMI and CSCI were used in the study because [Nardo, Saisana, Saltelli and Tarantola, 2005]:

- they offer the opportunity to include a large number of activities that can potentially be undertaken as part of customer service and relational sales,
- they enable an attempt to undertake a holistic analysis of the maturity of relational sales and the complexity of customer service processes in innovative enterprises,
- they provide the basis for reliable quantification and assessment of relationship sales maturity and the complexity of customer service processes,
- they enable the reduction of the dimensions of the analysis of the level of maturity of relational sales and the complexity of customer service processes in the enterprises surveyed.

Factors included in the study (both for the purposes of RSMI and CSCI) were designed to measure (on a 5-point scale) the approach of enterprises to the implementation of individual activities as part of conducting relationship sales and customer service. A value of "1" meant that the activity is very rarely implemented, and a value of "5" meant that the activity is very often implemented. The reliability of the scale was analysed using Cronbach's alpha coefficient to verify the quality of the data.

Table 4-6. Alfa Cronbach factor for RSMI

Alfa Cronbach	Number of factors
0.747	6

Source: own work.

Table 4-7. Main factors in the area of relational selling (sales) maturity

Factor	Mean	Standard deviation
f1–building trust and credibility in the opinion of the customer	4.76	0.668
f2–proper identification of the needs of the customer	4.68	0.709
f3–excellent presentation of a product or service by the seller	4.53	0.948
f5–the involvement of the seller in the sales process	4.59	0.954
f7–the intensity of contact with customers	4.34	1.094
f8–quick resolution of customer's problems or complaints	4.70	0.847

Source: own work.

In order to increase the transparency of the analysis, the individual indicators will be described separately. The RSMI indicator will be presented first. For a full list of eight factors describing the maturity of

relational sales, the value of the coefficient was 0.729 (the first iteration). Taking into account the methodological recommendations, the obtained value could be considered sufficient. The analysis conducted (in two subsequent iterations) indicated that it is possible to increase the reliability and quality of the scale in the event of sequentially removing factor 4 - confirmation of the sales process or closing the sale (second iteration) and factor 6 - engaging the client in the co-design and co-implementation of the product / service (third iteration). The third iteration showed that further exclusion of factors would not improve the quality of the mapping of the studied phenomenon of relational sales maturity in the research tool. Finally, six factors were used to construct the RSMI indicator (Table 7), with a high Cronbach's alpha coefficient of 0.747 (Table 6).

For the Relational Selling Maturity Index (RSMI) construction, methodological recommendations for the development of composite indices, developed by OECD [2008], were used. The adopted RSMI construction methodology included the following stages [Nardo, Saisana, Saltelli and Tarantola, 2005]:

1. determining the scope of measurement and the legitimacy of using the composite indicator,
2. selection of partial factors,
3. evaluation of the quality of empirical data,
4. assessment of the relationship between partial factors,
5. giving weights to the partial factors and their aggregation to the composite indicator.

The results of the implementation of the first three stages are included in Tables 1 and 2. In the assessment of the relationship between partial factors and their aggregation to the RSMI composite index, the factor analysis method was used (by means of the main component analysis - PCA) [Hudrliková, 2013]. The Kaiser-Mayer-Olkin coefficient and the Bartlett sphericity test were used to verify the correctness of the PCA analysis. The limit value of the KMO coefficient is commonly adopted at the level of 0.5 to 0.7 [Williams, Brown, Onsman, 2012]. In the analysed case, the KMO coefficient assumed a value of 0.576. Bartlett's sphericity test showed that the hypothesis of uncorrelated coefficients can be rejected - the statistic of the test is 260.2271 with a significance level of less than 0.001. Further PCA analyses are justified and methodically correct (Table 4-8).

Table 4-8. KMO sample adequacy and Bartlett test

KMO sample adequacy		0.576
Bartlett test	Approximate chi-square	260.271
	df	15
	Significance	0.000

Source: own work.

In the further analysis, the method of distinguishing main component factors with Varimax rotation was applied. However, the selection of components was based on the Kaiser criterion, which assumes that the eigenvalues of factors will be greater than one. Factor analysis gave the basis for qualifying six factors to two components: the sum of squares of charges after rotation was approximately 74% (Table 4-9).

Table 4-9. Two main components of the Relational Selling Maturity Index

Component	Name of component	Scope of factors	Defined % of variance after rotation	Weight for RSMI
C1	**Building lasting relationships with customers**	f1-f3	37.351	0.507
C2	**Commitment to customer service**	f5; f7-f8	36.365	0.493
			73.717	1.00

Source: own work.

Assigning individual factors to the components made it possible to name all components of the RSMI indicator and to assign component weights. The weights were normalised by the sums of the squares of charges that correspond to the part of the variance explained by the given component (Table 4-9). The developed composite indicator RSMI adopted the formula:

$$RSMI = (0.507 \cdot C1)/3 + (0.493 \cdot C2)/3 =$$
$$= (0.507 \cdot (f1+f2+f3))/3 + (0.493 \cdot (f5+f7+f8))/3.$$

The distribution of RSMI values is characterised by quite strong left-sided skewness, which means that the majority of values were above average (Table 4-10). Considering the fact that each of the six factors included in the RSMI structure was assessed on a 5-point scale ("1" means sporadic use of the action, and "5" very frequent use), the average value of the

indicator of 4.6 indicates that the average maturity of relational sales is at a high level throughout the sample.

Table 4-10. Descriptive statistics for RSMI

N (important)	Mean	Median	Dominant	Standard deviation	Variance
100	4.6008	4.8310	5.00	0.58450	0.342
Sum	**Skew**	**Kurtosis**	**Min**	**Max**	**Gap (Max-Min)**
460.08	-2.221	4.855	2.18	5.00	2.82

Source: own work.

The limit (median) value in the 5-point scale is 3.00. Generally, it can be assumed that the low level of maturity of relational sales is for the RSMI values in the range <1, 2.5, average level in the range <2.5, 3.5), and high in the range <3.5; 5>. However, this is a contractual and standardised division, because a precise indication of the level of maturity of the sales relationship requires the identification of the needs and capabilities of the given company in this respect.

Knowing the average level of maturity of relational sales, an in-depth analysis of this issue may be made from the perspective of particular areas of shaping relational sales (i.e. two components). For this purpose, the results of the factor analysis were used, which provided the basis for grouping individual factors reflecting specific actions under efficiency management into two thematically coherent components (Table 4-11). Due to the fact that individual factors and RSMI components were evaluated on a 5-point order scale, the Friedman test was used to assess the degree of maturity of the relational sales and the structure of the uniform ranking of components (Table 4-11).

Table 4-11. Statistics of Friedman's test and average ranks for RSMI components

Friedman's test	
N	100
Chi-square	33.640
df	1
Asymptotic significance	0.000

Average ranks–for each component	
Component C1: Building lasting relationships with customers	1.79
Component C2: Commitment to customer service	1.21

Source: own work.

The lowest level of maturity of relational sales in the surveyed enterprises concerned the area of commitment to customer service (C2 component) – the result of the Friedman test gave an average rank of 1.21. The greatest

complexity was noted for the component (C1) associated with building lasting relationships with customers – an average rank of 1.79 (Table 4-11).

Table 4-12. Statistics of Friedman's test and average ranks for each factor of RSMI

Friedman's test	
N	100
Chi-square	31.087
df	5
Significance	0.000

Average ranks–for each factor	
f1–building trust and credibility in the opinion of the customer	3.77
f8–quick solution of customer problems or complaints	3.74
f2–proper identification of the needs of the customer	3.61
f5–the involvement of the seller in the sales process	3.54
f3–excellent presentation of a product or service by the seller	3.37
f7–the intensity of contact with customers	2.99

Source: own work.

A detailed list of six partial factors adopted in the study for the RSMI structure and subjected to the Friedman test is presented in Table 4-12. Respondents relatively often indicated that, in shaping relational sales, they take into account building trust and credibility in the opinion of the customer and the quick solution of customer problems or complaints. On the other hand, the intensity of contact with customers in the context of increasing the maturity of relationship sales was viewed as having the least relative importance among the companies surveyed.

On the basis of the above analysis, Hypothesis no. 1, which states that relational selling in innovative enterprises has a high level of maturity, can be positively verified.

To verify Hypothesis no. 2, the Customer Service Complexity Index (CSCI) was used. Its construction proceeded in the same way as in the case of the RSMI indicator. For a full list of 12 factors describing the complexity of customer service, the value of Cronbach's alpha coefficient was 0.991 (Table 4-13). The first iteration already showed that further exclusion of factors will not improve the quality of the mapping of the studied phenomenon in the research tool. Finally, 12 factors were used to construct the CSCI index (Table 4-14).

Table 4-13. Alfa Cronbach factor for CSCI

Alfa Cronbach	Number of factors
0.991	12

Source: own work.

Table 4-14. Main factors in the area of customer service

Factor	Mean	Standard deviation
f1–full knowledge of the product/service on the seller side	4.48	1.306
f2–friendly attitude of the seller, and openness to the client (smile, kindness and personal culture on the part of the seller)	4.42	1.304
f3–maximum assistance offered during the both entire sales and after-sales processes and quick response to complaints	4.46	1.306
f4–meeting customer expectations and a quick diagnosis of needs, fast customer service, but solid information for the customer	4.36	1.299
f5–after-sale care and quick response to complaints	4.41	1.303
f6–communication for agreement at the rational level (facts, actions, information), and rapid sale response in direct contact or by electronic contact	4.28	1.341
f7–communication for agreement at the emotional level (verbal and non-verbal aspects of communication)	4.16	1.285
f8–the customer–guest and partner, and the seller–host (investing time and activities in customer satisfaction and joy)	4.16	1.383
f9–the seller will be happy to provide assistance and advice to the customer and respond quickly to sales problems, and does not make mistakes in customer service	4.26	1.346
f10–sellers must be sure of their skills and knowledge, as well as easily transmit information, and also use intelligible language	4.38	1.347
f11–the seller needs to actively listen to the customer and show sensitivity to customer service, and the consumer feels No. 1 in the sales process	4.35	1.351
f12–seller builds customer loyalty at each sales transaction and the client is able to trust the seller implicitly	4.31	1.346

Source: own work.

Similarly to the RSMI index, in the assessment of relations between partial factors of customer service and their aggregation to the composite CSCI index, the factor analysis method was used (by means of the main component analysis - PCA). The value of the KMO coefficient is at the level of 0.957. However, Bartlett's sphericity tests showed that the hypothesis of uncorrelated coefficients can be rejected - the test statistic is 2694.701 with a significance level lower than 0.001. Further PCA analyses are justified and methodically correct (Table 4-15).

Table 4-15. KMO sample adequacy and Bartlett test

KMO sample adequacy		0.957
Bartlett test	Approximate chi-square	2694.701
	df	66
	Significance	0.000

Source: own work.

In further analysis, the method of distinguishing main component factors was also used. However, the selection of components was based on the Kaiser criterion. Factor analysis gave the basis for qualifying 12 factors to only one component, the sum of squares of charges after rotation amounted to approximately 91% (Table 4-16).

Table 4-16. One component of the Customer Service Complexity Index

Component	Name of component	Scope of factors	Defined % of variance	Weight for CSCI
C1	**Customer Service**	f1-f12	91.172	1.00

Source: own work.

The developed CSCI composite index has adopted the formula:

$$CSCI = C1/12 = (f1+f2+f3+f4+f5+f6+f7+f8+f9+f10+f11+f12)/12.$$

The distribution of CSCI values is characterised by quite strong left-side skewness which means that the majority of values were above the average value (Table 4-17). Considering the fact that each of the 12 factors included in the CSCI indicator structure was assessed on a 5-point scale, the average value of the indicator at the level of 4.3 indicates that, on average, the complexity of customer service is at a high level throughout the sample. The limit (median) value in the 5-point scale is 3.00. Generally, it can be assumed that the low level of customer service complexity - as was the case for the RSMI indicator - is for CSCI values in the range of <1; 2.5, average level in the range of <2.5; 3.5), and high in the range of <3.5; 5>.

Table 4-17. Descriptive statistics for CSCI

N (important)	Mean	Median	Dominant	Standard deviation	Variance
100	4.3358	4.8333	5.00	1.26628	1.603
Sum	**Skew**	**Kurtosis**	**Minimum**	**Maximum**	**Gap**
433.58	-2.161	3.002	1.00	5.00	4.00

Source: own work.

Table 4-18.Statistics of Friedman's test and average ranks for each factor of CSCI

Friedman's test	
N	100
Chi-square	86.420
df	11
Significance	0.000

Average ranks–for each factor	
f1–full knowledge of the product/service on the seller side	7.20
f3–maximum assistance offered during the both entire sales and after-sales processes and quick response to complaints	7.10
f2–friendly attitude of the seller, and openness to the client (smile, kindness and personal culture on the part of the seller)	6.87
f5–after-sale care and quick response to complaints	6.81
f10–sellers must be sure of their skills and knowledge, as well as easily transmit information, and also use intelligible language	6.80
f11–the seller needs to actively listen to the customer and show sensitivity to customer's service, and the consumer feels No. 1 in the sales process	6.65
f4–meeting the customer expectations and a quick diagnosis of its needs, fast customer service, but solid information for the customer	6.51
f12–seller builds customer loyalty at each sales transaction and the client is able to trust the seller implicitly	6.40
f6–communication for agreement at the rational level (facts, actions, information), and rapid sales response in direct contact or by electronic contact	6.26
f9–the seller will be happy to provide assistance and advice to the customer and respond quickly to sales problems, and does not make mistakes in customer service	6.22
f8–the customer–guest and partner, and the seller–host (investing time and activities in customer's satisfaction and joy)	5.78
f7–communication for agreement at the emotional level (verbal and non-verbal aspects of communication)	5.41

Source: own work.

A detailed list of the 12 partial factors adopted in the study to construct the CSCI index and those subjected to the Friedman test is presented in Table 4-18. Respondents relatively often indicated that, in the implementation of customer service, they take into account the full knowledge of the product and maximum assistance throughout the complaints process. On the other hand, the enterprises surveyed were relatively least concerned with increasing the complexity of customer service, investing time and activities in customer satisfaction and joy and communication for the agreement at the emotional level.

On the basis of the above analysis, hypothesis no. 2, which says that customer service in innovative enterprises has a high level of complexity, can be positively verified.

Verification of hypothesis no. 3 will be carried out using non-parametric correlation (Spearman's rho), because the RSMI and CSCI indices are not characterised by normal distribution (Table 4-19).

Table 4-19. Correlation between RSMI and CSCI

			CSCI
rho Spearman	**RSMI**	**Correlation coefficient**	**0.314****
		Significance (reversible)	0.001
		N	100

** Correlation significant at 0.01 (reversible).
Source: own work.

Based on the analysis of the Spearman rho coefficient value (0.314) it can be assumed that there is a statistically significant positive correlation between the maturity of the relational sales and the complexity of customer service in the surveyed enterprises. However, this correlation is weak. **Therefore, hypothesis no. 3 can be positively verified, indicating that the higher the maturity of relational sales, the higher the level of complexity of innovative enterprises.**

Conclusions and discussion

Contemporary enterprises, especially those operating in innovative industries and sectors, are focused on increasing their competitiveness and increasing their market share. One of the ways to achieve this goal is to establish lasting relationships with clients, including through proper implementation and application of relational sales and customer service. Both areas are particularly important for value as perceived by customers. Innovative enterprises may use various relational sales techniques which can induce the customer to be satisfied with the purchase and permanently "bond" with the company.

The empirical study focused primarily on the issue of linking the methods of relational sales and customer service in innovative enterprises operating on the NewConnect market in Poland. The analyses conducted were aimed at providing answers to the question of the level at which relational sales maturity and the complexity of customer service in this class of enterprise was shaped. An attempt was also made to indicate what the direction and strength of dependence between the maturity of relational sales and the complexity of customer service are. For this purpose, three hypotheses have been put forward that have been positively verified. The empirical study proved that:

- Relational sales in innovative enterprises have a high level of maturity.

- Customer service in innovative enterprises has a high level of complexity.
- The higher the level of maturity of relational sales, the higher the level of complexity of customer service in innovative enterprises.
- The higher level of maturity of relational sales.

Fig. 4-2. Process of creating the maturity of relational sales as a component of a business model
Source: own work.

Relational sales, including as a result of using appropriate techniques and customer service at the level expected by the customer, should be treated as one of the important components of contemporary business models. The authors of this chapter propose a process/model of creating relational sales maturity (Figure 4-2) which can be treated as a universal solution and applicable to various types of activities. This process begins with the first purchase transaction and ends with the customer's trust and its permanent "bonding" with the enterprise. In order to implement this model, it should be remembered that, in the enterprise, activities related to shaping customer service and relational sales should be used in parallel. Fragmentary or selective application of techniques in these areas or omitting one of these two areas is not admissible. In order to improve the business model, it is necessary to "combine" relational sales and customer service into one coherent, integrated, comprehensive and complete "operating system".

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CHAPTER 5

CSR - A DIRECTION FOR THE SUSTAINABLE DEVELOPMENT OF SMALL AND MEDIUM-SIZED ENTERPRISES. CURRENT RESEARCH TRENDS IN LIGHT OF SELECTED LITERATURE

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Introduction

Expecting social acceptance for the ways and effects of their functioning, organisations extend their areas of responsibility to include the environment. Entrepreneurs' greater level of awareness in perceiving problems connected with the impact of their organisation on the environment results in taking the environment, social interests and relations with various groups of stakeholders into account as early as the stage of establishing strategy. Taking such an approach is the concept of corporate social responsibility (CSR). CSR is one of the most modern and promising business strategies on today's market. It is mainly large enterprises which are interested in this type of activity, whereas small businesses recognise CSR issues but do not necessarily have knowledge of the standards in the area of their implementation.

CSR is not a new concept, but the need to popularise and implement it in organisations has been particularly evident in recent years. Researchers stress that corporate social responsibility refers mainly to large enterprises,

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for which appropriate standards of behaviour have been established. The situation seems less optimistic for medium-sized and small enterprises, which account for almost 99% of enterprises in the economy. With the complexity and heterogeneity of such enterprises, it is necessary to undertake multifaceted research to analyse and diagnose their capabilities in terms of implementing the concept of CSR. Although various aspects of the concept of CSR have been analysed for many years, this subject is explored in much greater detail nowadays.

Therefore, the main aim of the chapter is an attempt to outline the trends in research and development concerning corporate social responsibility, especially with respect to the sector of small and medium-sized enterprises. The chapter presents the concept of CSR in theoretical terms, taking into account the specificity of SME. The authors present the findings of empirical studies that were based on using bibliometrics to conduct quantitative analyses of scientific publications concerning the issues addressed in the studies. The analysis focused on publications indexed in the Scopus database between 2000 and 2008.

1. Theoretical aspects of corporate social responsibility (CSR)

The literature offers various approaches to the concept of corporate social responsibility (CSR). This results mainly from the fact that the different dimensions of corporate social responsibility are non-homogeneous and very broad (Wąsowska and Pawłowski, 2011, p.14). The idea of this concept is to promote and improve everything that can benefit not only a company but also a customer in the broad sense, taking into account the social conditions in which the company operates (Gasiński and Piskalski, 2009). Thus, from the perspective of enterprises, CSR means focusing not only on economic aspects but also on ecological and ethical ones (Zbiegień-Maciąg, 1997, p. 48). CSR is perceived as a new direction for changes in sustainable development that respects the principles of economics, ecology and ethics (Korpus, 2006, p. 84). Social responsibility is not only about meeting legal and formal requirements or sponsoring or undertaking occasional charity projects. It should be manifested in corporate strategy aimed at constant, long-term, and above all diligent actions for the benefit of the environment.

Corporate social responsibility can be understood as entrepreneurs' commitment to contributing to sustainable socio-economic development. This commitment goes beyond the minimum established by legal standards and is essentially a social and ecological commitment (Bernatt,

2009, p.30). A. Dahlsrud (2009) identified a five-dimensional definition of CSR (tab. 5-1.). B. Jamka (2010) identifies sustainable development on a microeconomic scale with corporate social responsibility. Other proposals include the following activities: defining the mission and values and relying on these values when creating an organisation's social policy; taking into account the role of stakeholders as well as developing programmes of cooperation with such stakeholders; and implementing the idea of sustainable business as part of an enterprise's strategy (Kaźmierczak, 2010).

Table 5-1. The five dimensions of CSR definition

Dimensions	**The definition is coded to the dimension if it refers to**
The environmental dimension	The natural environment
The social dimension	The relationship between business and society
The economic dimension	Socio-economic or financial aspects, including describing CSR in terms of a business operation
The stakeholder dimension	Stakeholders or stakeholder groups
The voluntariness dimension	Actions not prescribed by law

Source: Dahlsrud (2008), p.1-13.

A. Chodyński (2009) thinks that, at the level of an enterprise, CSR refers to balancing economic, social and ecological goals in the concept of sustainable business. The author points out that ecological aspects should be aligned with an organisation's entrepreneurial orientation, including the concept of ecological entrepreneurship, which is an element of responsible entrepreneurship.

Thus, when analysing the issues of an enterprise, general issues of development management should not be omitted. It is necessary to take social, economic and ecological aspects into account (Jenkins, 2009). CSR concerns the activities that contribute to sustainable development, that is to say the integration of economic, social and environmental management models to ensure business sustainability aspects (Raynard and Forstater, 2002).

2. Corporate social responsibility as a challenge in small and medium-sized enterprises

The concept of social responsibility is not limited to large enterprises. It is broadly defined as the overall contribution of a business to sustainable development (SD), and should therefore be equally valid for large, medium and small enterprises (Fox, 2005).

Small and medium-sized enterprises have sufficient potential to undertake actions as part of CSR aimed at the integration of local communities, with a focus on respecting the environment, employee-oriented actions and market-oriented actions (Raynard and Forstater, 2002). For small and medium-sized enterprises, the concept of CSR can be a valuable means by which to build a competitive position, build an image and reach a broad target group (Cambra-Fierro, Wilson and Polo-Redondo, 2013). By cooperating with institutions, foundations and associations and pursuing charitable objectives, a company builds an image of a socially committed brand. The implementation of the concept of CSR can benefit small and medium-sized enterprises in various ways: through establishing long-term and trust-based relationships with external stakeholders, which include: local community, cooperating entities, non-governmental organisations, investors, etc.; strengthening a positive image and recognition among internal and external stakeholders (local community, public opinion, market analysts, among others); contributing to a positive perception among potential employees and increased satisfaction, loyalty and motivation among existing employees; contributing to a positive image among present and potential investors and customers; and higher credibility and a stronger competitive position on the market. Focusing on activities connected with the implementation of corporate social responsibility is, for small and medium-sized enterprises, a strategy that enables them to work towards sustainable development in a turbulent and global environment (Mazur-Wierzbicka, 2012).

The key role in the implementation of corporate social responsibility in small and medium-sized enterprises is played by the entrepreneur/owner, and in particular their knowledge, skills and experience, as well as their value system (Stawicka and Wołoszyn, 2013, p. 46). A problem is posed by the lack of standards for socially responsible activities for small and medium-sized enterprises, although numerous initiatives to popularise CSR are already noticeable, including among small and medium-sized enterprises (e.g.: “Stormberg AS” – a small Norwegian wholesaler, “enkstatt GmbH” – a small Austrian company, “LRGebäudereinigung” - a

medium-sized German company, and “Kalevala Koru Oy” - a medium-sized Finnish company).

For small and medium-sized companies, the most discouraging factors include a lack of favourable regulations and support from local authorities and public administration, as well as a lack of managerial engagement in socially responsible activities and lack of support for such practices in a company's business environment. Other barriers are as follows: the slow and long-term character of all the benefits, social indifference, failure to disseminate information pertaining to the concept of CSR, and lack of quick results.

Entrepreneurs very often associate the implementation of the CSR standard with huge efforts and financial expenditures that social responsibility would require from their company. This is a huge misconception. Numerous examples reveal that social responsibility does not have to cost much. Small and medium-sized enterprises are often unaware that their organisations have already undertaken activities that fit the concept of CSR, and they are very close to being regarded as socially responsible (Elving et al., 2015). As studies conducted by M. Sipa and M. Smolarek (2017) show, although small and medium-sized entrepreneurs are quite aware of their role in the development of the local community, they are not aware of the full potential of CSR. As a result, they do not tap it fully. Their activities are often occasional, and informal in character - referred to as unaware CSR. Microenterprises in particular are not familiar with this concept and not aware of the benefits of investing in CSR. For that reason, it is necessary to highlight the need to increase awareness of and disseminate information about CSR, identify the ways to reach small companies and develop measurement tools for the cost-effectiveness ratio of CSR activities.

3. CSR in small and medium-sized enterprises - research trends

Methodological information

In order to analyse current research trends in leading scientific publications connected with the area of corporate social responsibility, the number of publications available in the Scopus and Science Direct databases were first verified. The Scopus database contained a slightly higher number of publications; therefore, the authors concentrated on publications indexed in this database. The analysis was based on the terms "corporate social responsibility" and "corporate social responsibility &

SME". It concentrated on search results for the above-mentioned terms in the database in the fields "Article title, Abstract, Keywords". The analysis covered the period from 2000 to 2018, which saw a dynamic increase in interest in the issue of corporate social responsibility. The results were organised and partly aggregated.

Results of the analysis

Although various aspects of CSR have been the subject of analysis for many years now, this subject is explored in much greater detail nowadays. Leading databases covering academic literature on management have recorded an increase in the number of publications devoted to the issues of corporate social responsibility and the sector of small and medium-sized enterprises. In the Scopus database (which was accepted as the source of data for analysis), the number of publications on CSR increased over the period 1960-2018 from not many to 17,962. Increased interest in this subject was especially visible after 2000.

An analysis of the number of publications indexed in the Scopus database showed a significant increase in interest in corporate social responsibility. It was manifested, among other things, in the number of scientific papers analysing issues connected with that area, especially after the year 2000. In view of the above, the analysis focused on the years 2000-2018. In that period, the number of publications addressing CSR was 14,162, which accounts for 98.88% of the publications that were indexed in the Scopus database and addressed this subject from 1972 (Fig. 5-1).

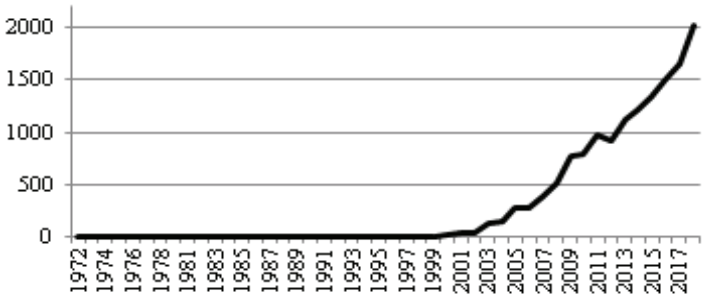

Fig. 5-1. Number of academic publications on corporate social responsibility (1972-2018)
Source: own processing, data extracted from the Scopus database

As previously mentioned, from 2000 onward the number of publications addressing CSR systematically grew. The analysis of chain dynamics shows that the first visible increase in the number of publications indexed in the Scopus database took place in 2005, increasing by 134 compared to the previous year. In the period analysed, a decrease compared to the previous year was only recorded in 2012, when there were 44 fewer publications compared to 2011. The largest number of publications come from the USA (16.69%), followed by the United Kingdom (10.60%), Spain (5.35%), Australia (5.07%) and China (4.86%). A detailed distribution of the data is presented in Table 5-2.

Table 5-2. Main countries of origin of published documents on CSR (2000-2018 in the Scopus database [%])

	Country		[%]		Country		[%]
1	United States	2975	**16.69**	6	Canada	725	**4.07**
2	United Kingdom	1889	**10.60**	7	France	508	**2.85**
3	Spain	953	**5.35**	8	Netherlands	498	**2.79**
4	Australia	903	**5.07**	9	Germany	495	**2.78**
5	China	867	**4.86**	10	Italy	481	**2.70**

Source: own processing, data extracted from the Scopus database

Publications addressing the subject of corporate social responsibility refer to various thematic areas. However, three areas prevail, as almost a third of publications combine this subject with an analysis of issues from the field of business, management and accounting, followed by such fields as social sciences (20.81%) and economics, econometrics and finance (14.96%). There are also visible connections with issues from environmental science and arts & humanities, as well as engineering. The details are presented in Fig 2. In terms of the type of publications, papers (70.68%) account for the majority, followed by book chapters (8.49%) and conference papers (8.47%).

Research on corporate social responsibility was also conducted with reference to the issues connected with the sector of small and medium-sized enterprises. Such entities dominate in economies all over the world. From among the resources addressing the issue of corporate social responsibility, publications referring to small and medium-sized entities were identified (Fig.5-3).

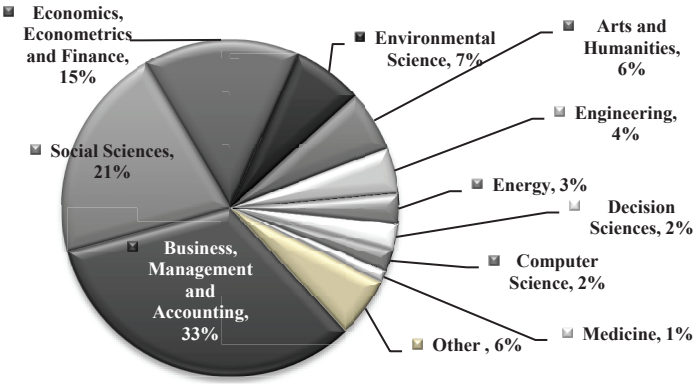

Fig. 5-2. Top 10 research areas by CSR subject (2000-2018 in the Scopus database [%])
Source: own processing, data extracted from the Scopus database

The analysis showed, on the one hand, a year-on-year increase in the interest among researchers in combining these two issues. On the other hand, it should be stressed that this issue is in the initial stage of exploration by researchers, which is evidenced by the small number of publications (656) in the period analysed.

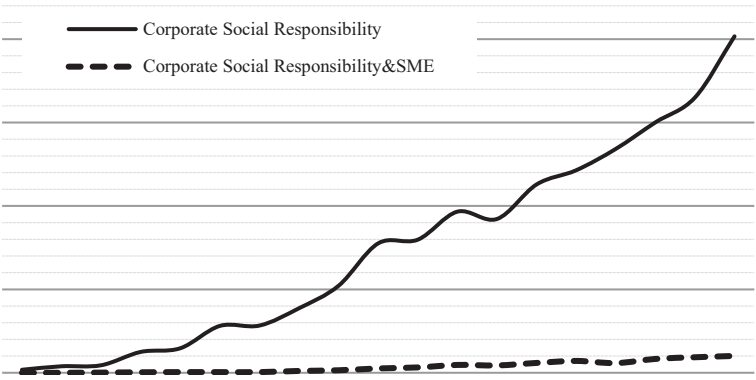

Fig. 5-3. Number of academic publications on corporate social responsibility and small & medium enterprises (2000-2018)
Source: own processing, data extracted from the Scopus database

It is also worth noting that the first publication in the database combining the issues of corporate social responsibility and the sector of small and medium-sized enterprises was recorded in 2002. The low level of recognition of CSR problems in the context of SMEs is also confirmed by M. Larrán Jorge, J. Herrera Madueño, M.P Lechuga Sancho and D. Martínez-Martínez (2016).

The subject areas in this context are consistent with the areas of all the publications which address corporate social responsibility. These are mainly: business, management and accounting (33.50%), social sciences (19.11%) and economics, econometrics and finance (11.92%). More details are presented in Table 5-3.

Table 5-3. Top subject areas by CSR subject (2000-2018 in the Scopus database [%])

Subject areas	[%]	Subject areas	[%]
Business, Management and Accounting	**33.50**	Decision Sciences	**3.39**
Social Sciences	**19.11**	Computer Science	**2.47**
Economics, Econometrics and Finance	**11.92**	Earth and Planetary Sciences	**1.06**
Environmental Science	**9.73**	Mathematics	**0.99**
Engineering	**6.21**	Agricultural and Biological Sciences	**0.71**
Arts and Humanities	**4.87**	Psychology	**0.42**
Energy	**4.44**	Other	**1.20**

Source: own processing, data extracted from the Scopus database

While the United States is dominant in the overall context of all publications addressing the issue of CSR, in the case of publications combining the subject of corporate social responsibility with the issues of small and medium-sized enterprises, there is a visible prevalence of publications from European countries. The largest number of publications come from the United Kingdom (12.06%), followed by Spain (7.23%) and Italy (6.31%). The United States comes fourth (6.31%) and Australia (5.74%) fifth. The details are presented in Table 5-4.

Table 5-4. Main countries of origin of published documents by CSR subject (2000-2018 in the Scopus database [%])

	Country	%		Country	%
1	United Kingdom	**12.06**	6	France	**3.67**
2	Spain	**7.23**	7	Netherlands	**3.67**
3	Italy	**6.31**	8	China	**3.56**
4	United States	**6.31**	9	Denmark	**3.10**
5	Australia	**5.74**	10	Germany	**2.99**

Source: own processing, data extracted from the Scopus database

Research into the issues of CSR in small and medium-sized enterprises focuses mainly on its economic and social effects, industry, supply chain management, corporate strategy, the theory of stakeholders, innovations, social aspects and environmental management.

Conclusion

The need for socially responsible behaviour is increasingly emphasised in the implementation of the basic objectives of the business activity of present-day entrepreneurs, who should take into account both economic aspects and socio-environmental interests because of their high social awareness and need to engage in solving socially important problems, rather than perceiving CSR as a concept by which to build a competitive advantage.

In terms of the size of the entities that implement the concept of CSR, it should be noted that it is most often implemented by large companies with significant internal resources. In small and medium-sized entities, especially small ones, a significant role in the implementation of this concept is played by the owner, their knowledge and ethical values. Effective implementation of the concept of CSR in enterprises of this size requires a deep exploration of their capabilities in terms of its implementation, as well as developing and using a complex and integrated model for supporting the implementation of this concept. As a result, the issue of corporate social responsibility is increasingly addressed by numerous researchers from various scientific fields.

Bibliometric studies show that researchers are increasingly noticing the growing need for organisations to undertake activities in line with the concept of CSR. This is visible, among other things, in the dynamically growing number of publications addressing this subject. A significant

increase was recorded in 2009 and 2018. However, the bibliometric analysis showed a significant gap in the research into CSR focusing on the sector of small and medium-sized enterprises, especially small ones. Publications in this area only appeared in 2002, and despite the gradual increase in their number, the gap is still growing.

Most of the publications devoted to CSR come from the USA, but in the case of publications taking small and medium-sized enterprises into account, research in this area most often originates from European countries such as Great Britain, Spain and Italy.

The analysis has also shown that the issues addressed in this publication most often focus around business, management and accounting, social sciences, and economics, econometrics and finance. The concept of CSR is also considered in the context of engineering, arts and humanities, energy, computer science, earth and planetary sciences, mathematics, agricultural and biological sciences as well as psychology.

In summary, the challenges connected with the concept of CSR in current economic and social conditions as signalled in this paper certainly do not exhaust the broad range of problems faced by present researchers. However, the paper indicates leading trends in this field, both in scientific and practical literature, focusing attention on the specificity of small and medium-sized enterprises.

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CHAPTER 6

THE RELATIONSHIP BETWEEN THE MONETISATION AND PROFITABILITY OF DIGITAL BUSINESS MODELS

MAREK JABŁOŃSKI[1]

Abstract

The chapter presents the issue of the monetisation of business models of enterprises operating in the digital economy. The author assumes that every business model should be monetised, and thus be economically justified. Attention was paid to assessing the profitability of the business models studied and defining the sources of their revenues, as well as analysing the economic and social benefits of key actors. The aim of the chapter is to conduct a critical analysis of the sources of the monetisation of business models of selected enterprises operating in the digital economy.

Introduction

Modern business models are characterised by an innovative approach to creating and providing value to their recipients. In many cases, they require the sophisticated logic of human interaction with the use of innovative technological solutions. At the same time, they often undermine current economic rules. The market share of digital business models is increasing dynamically, changing the existing order not only in global markets (Ng, 2014).

The classical economy of A. Smith represented by the theories of the free market economy and economic politics, the theory of economic growth, the theory of exchange value (market prices) and the theory of

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foreign trade is contrasted with the assumptions of the digital economy, in particular the Sharing Economy, which is defined as a socio-economic system built around the division of human and material resources. It includes the joint creation, production, distribution, trade and consumption of goods and services by different people, as well as organisations. Factors such as the ubiquity of the Internet and mobile devices, the abundance of idle goods, growing consumer awareness of environmental sustainability, and the economic recession leading to increased unemployment have attracted consumers to transactions that allow them to access and profit from unused assets more easily (Parentea, Geleilateb and Rongc, 2018). As regards the digital economy, many issues require scientific research to better understand this trend and to explain this phenomenon of the modern economy. The effect of the impact of the digital economy trend is the dynamic emergence of new business models based on these assumptions. At the same time, two achievable key goals can be distinguished through the use of business models based on the digital economy, in particular the sharing economy: the social goal, which facilitates the possibility of people and organisations sharing unused resources, and the economic goal, which enables the creation of wealth for the creators of these business models.

The research problem posed in the context of the title of the chapter is an analysis of the issue of profitability in relation to the monetisation of business models operating in the digital economy. In many cases, the achievement of the expected ability to monetise the business model is the primary goal of contemporary business solution designers.

This is evidenced by the words of Nicolas Brusson, CEO and co-founder of BlaBlaCar. When asked how they earn, he answers:

> We do not earn in many countries yet. In some, we have not even started the monetisation phase. In countries where we already have a business model, such as France, Spain, Great Britain and Benelux, we charge a transaction fee. If this is large enough, we take 10 percent. So if the driver charges 20 euros per a car seat, the passenger pays 22 euros, and BlaBlaCar receives 2 euros from it. But at this price, we not only service the transaction and the platform, but also provide a guarantee in the case of cancellation: if the passenger does not show up, the driver still receives the money.

Importantly, he also has an interesting attitude to shareholders. He says that:

> ... We put employees first, then community members, and finally shareholders
> *(https://businessinsider.com.pl/strategie/zarzadzanie/jak-zarabia-blablacar-o-modelu-biznesowym-mowi-ceo-nicolas-brusson/ddr0rcz).*

This is crucial in the context of the social aspect of creating value through the business model, but difficult to accept in terms of business monetisation and the creation of value for shareholders. The profitability of business models is currently the subject of research by V. Kumar, A. Lahiri, O. Bahadir Dogan (2018); J. Benitez, Y. Chenc, T.S.H. Teod, A. Ajamieh (2018); S.C. Müller, I.M. Welpe (2018); V. Kumara, A. Ananda, H. Songaa (2017) and others. The authors of these studies point to a significant problem in the achievement of profitability based on new business formulas.

Legal and tax aspects also have a key impact on the development and future effects of this type of business venture. The profitability, valuation and monetisation of business models of companies operating in the digital economy have become issues which require analysis. The aim of the chapter is to conduct a critical analysis of the sources and methods of the monetisation and profitability of business models of companies operating in the digital economy.

1. The theoretical framework of business model monetisation

Monetisation is a process of converting something into money. It is the conversion of assets such as a business model, data sets, etc. into money. It is important to show the difference between a revenue model and a monetisation model. The revenue model is just one aspect of the business model - and it is simply a method or process in which a company intends to extract (not attract) money from the "market" for the value created. The revenue model is the way money flows from the paying customer to the company. The basic revenue model is, for example, a single price (simple product sale at a fixed price). The general monetisation model is a continuous method based on the logic of a unique business model consisting of the processing of the product delivered or its users for permanent sale. The basic condition for obtaining the monetisation effect of the business model is attracting a large number of recipients of the proposed business solution. The business model should attract them by using service formulas and a specific value proposition that is unique compared to other market proposals. Often in business practice there are so-called opposite monetisation models, for example, offering software

cheaply or even for free and making money (monetisation) by selling non-standard programming services, consultations or updates (https://www.quora.com/What-is-the-difference-between-a-revenue-model-and-a-monetization-model). Monetisation is therefore a way for the company to earn by means of a business model and is not direct proof of the sale transaction.

The Centre for Information Systems Research (CISR) defines monetisation as "an action involving the exchange of products or services based on information for legal means of payment of equivalent value". To put it simply, it is about converting the digital currency, which is Big Data accumulated by the company, into analogue capital, which can be used in the market or which will help optimise business operations. Data monetisation is therefore the possibility of the direct and indirect financing of knowledge of digital behaviours and the profiles of interest of the company's customers or Internet users (http://biznestuba.pl/biznes-na-zywo/4-kroki-do-monetyzacji-danych-w-firmie/). The way of interpreting and reflecting the process of business model monetisation is the so-called monetisation curve. It is best to describe a monetisation curve in the context of the specificity of the freemium business model. The continuous monetisation curve describes the possible extent to which users can monetise; it is a reflection of the size and depth of the product's catalogue of purchasable items. Each point along the curve is a measurement of the percentage of the total user base that will ever reach a certain specific lifetime customer value. When graphed, the y-axis represents the percentages of the user base and the x-axis represents lifetime customer values, with the curve generally taking the form of a Pareto distribution, as seen in Figure 6-1.

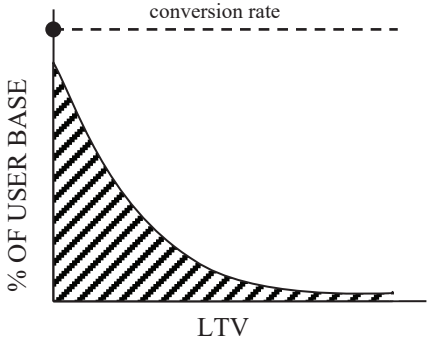

Fig. 6-1. The continuous monetisation curve.
Source: Own study.

The y-intercept, or the percentage of users expected to hold the most common lifetime customer value above $0, sits at a value below the conversion rate when more than one lifetime customer value of the product is possible; this is because the sum of the area under the curve represents 100 percent of paying users, and it is unlikely that all converted users (i.e. those users that directly contribute revenue) would have the same lifetime customer value. In other words, the curve intercepts the y-axis at the most common LTV, which is generally the minimum level of monetisation. But unless the most common non-zero LTV is the only possible non-zero LTV, the percentage of users holding that value will not match the conversion rate; it will be lower, given further possible levels of monetisation. The curve decays from the y-intercept for increasing values on the x-axis until it forms a very long, thin tail for extremely high lifetime customer values. The curve intercepts the x-axis at some point (usually theoretical), beyond which a level of total monetisation for any user cannot be predicted. The curve as described is actually discrete, not continuous (and, in fact, no curve of monetary values can be continuous, as monetary values are limited to two decimal points and are thus countable). Describing the curve as continuous instils a sense, within the product catalogue design, that every user who is willing to contribute monetarily to a product can be uniquely and individually served at a specific price point. This design principle is the core of the freemium ethos and represents the strategic distinction between freemium and paid purchase strategy: when users believe that a product accommodates their personal, idiosyncratic tastes, they are willing to pay a premium for that accommodation. It is this structural reality which allows freemium products to generate higher revenues than they would under other commercial models (Seufert, 2014).

The issue of monetisation is closely related to the concept of the scalability of digital business models. Figure 2-2 presents three principal propositions. Below it was proposed that business models that engage both non-paying users and paying customers, facilitate customer participation in the production of products or services and open the value chain to network governance tend to promote scalability. They also discuss how the interactions between these three business model design elements may affect scalability, as well as the factors that might offset scalability. Figure 6-2 illustrates this approach to the scalability of business models.

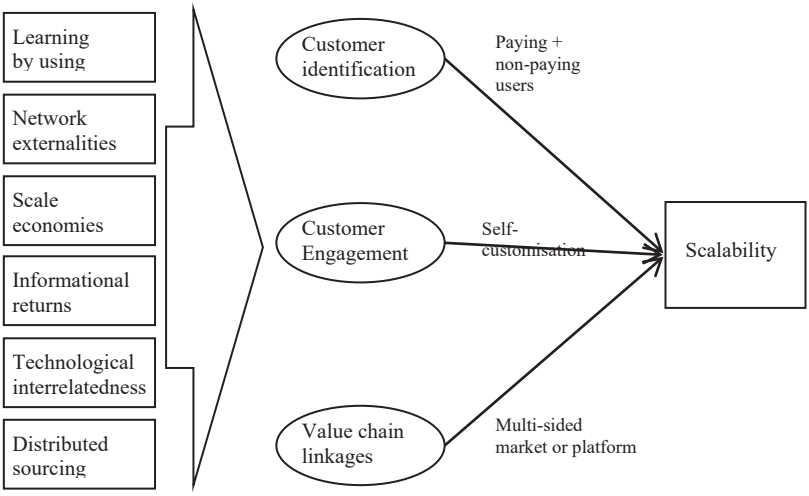

Fig. 6-2. Sources and mechanisms for scalable digital business models
Source: own study based on Zhang, Lichtenstein and Gander, 2015.

Almost perfectly scalable businesses are those in which the product does not require further modification, and the sales and distribution system is almost completely automated. This short sentence easily interprets the idea of business model scalability that designers of contemporary business models aspire to.

A subjective aspect in the process of business model monetisation is the creation of value for the customer. This is the value of technical, economic, service and social benefits expressed in monetary terms that the customer obtains in return for the price paid for the market offer (Anderson, Kumar and Narus, 2007). The delivery of effectively created value through the monetisation mechanism is therefore a key aspect of the search for the creators of modern innovative business models.

2. The practical framework of business model monetisation

Monetisation methods can include solutions such as freemium, premium, trial, subscriptions, etc. Monetisation is included in the intention of business model designers and it is not always possible for it to be effective from the very beginning. Efforts to create the possibility of monetising the business model are often required, even lasting a few years

especially in the case of Start-Ups, and are not always successful. In this way, monetisation becomes the basic object that the efforts of innovative business model designers are focused on. The financial aspect is of fundamental importance in this context. As regards digital platforms, the following problems that are related to the issue of business model monetisation can be identified. Currently, the data market is suffering from the following problems:

1) There is no platform for monetising data that involves a wide range of primary data providers;
2) Individuals (primary data owners) are either not compensated for sharing their personal data or are compensated by non-monetary rewards;
3) There is a lack of platforms that enable individuals to sell their personal data directly. Usually, secondary data owners such as organisations control this operation and benefit from it; and
4) There is a lack of clear classification of data types and data quality levels; a classification that is required by a wide range of domains such as the health care domain, but also required for estimating the monetary value of the data - a value that may change over time (Tang, October 2016).

In this respect, the creators of business models have a lot of space to create innovative solutions in terms of the monetisation of this type of business model.

The diagram below depicts an approach to ideating, documenting and evaluating monetisation scenarios across various dimensions. The ideation and prioritisation process is a must-do activity that helps us narrow the art of possible to the domain of feasible and high probability; the domain of ideas (KPMG, September 2015).

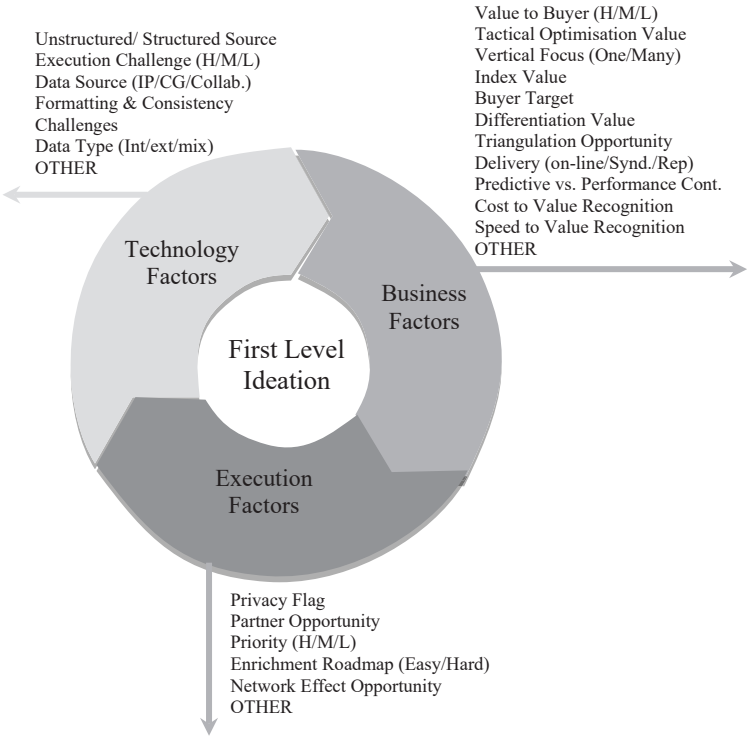

Fig. 6-3. Data Monetisation Scenarios
Source: Own study based on: KPMG, September 2015.

The monetisation of digitally distributed information requires a refreshed mindset that recognises the abundance of choice that consumers have, most of which allows for free access to content. In the digital world, there are an unlimited number of pages that can be published and an infinite number of advertisements to be sold. The marginal cost of publishing and ad sales is close to zero (Perell, 2016). Monetisation is of key importance in the case of computer game producers. For example, companies that produce free games for mobile devices have a different business specificity. They usually release more than one game a year, so the lifecycle of these products and their monetisation is different. The monetisation curve is reversed compared to premium games - revenues at the beginning are very small, and then grow with the number of downloads and users (https://www.bankier.pl/wiadomosc/O-czym-pamietac-inwestujac-w-

producentow-gier-7613878.html). Today, the highest revenue is generated by applications with a hybrid cashing model. First of all, the free version of this application which displays ads is available on most popular mobile platforms - the first method of cashing. A user can upgrade the application to the premium version by making micropayments - the second method of cashing. If the application is available on the global market, it can reach up to several million users as a result. Such an approach - that is, giving the application to the user for free and allowing the customer to make a conscious decision whether he wants to pay - is currently a method commonly used by companies on the mobile market. Very simple psychological mechanisms apply here, which allow for the highest profits to be earned from such an application (http://www.e-profit.inkubator starter.pl/jak-zarobic-na-aplikacjach-i-grach-mobilnych/). According to Doug Laney of the analytical company Gartner, one of the key researchers in the IT industry, the indirect benefits of data monetisation include the optimisation of business process efficiency, reduction of business risk, support in developing new products and probing new markets, as well as building and strengthening partner relationships (e.g. in the form of Big Data expert consultancy). On the other hand, the array of direct benefits includes market data trading (data warehouses), expanding the existing products or services of the company with information obtained during data analysis, the sale of raw data through brokers and offering access to analysed data to other companies in the subscription model. The monetisation process involves assigning monetary values to specific profiles and user groups. The basis for valuation is the value of the information they generate and the rarity of their profile. This is influenced by many factors, including the history of search engine queries, the origin of an Internet user, their age, education, interests (music, books, cuisine, etc.), websites browsed, recently purchased items, etc: in other words – cookies, or the digital traces that Internet users leave after visiting websites. By combining these elements into one whole, companies can start the process of data monetisation (http://biznestuba.pl/biznes-na-zywo/4-kroki-do-monetyzacji-danych-w-firmie/). Monetisation should be positively correlated with the profitability of business models. This issue now seems crucial in terms of searching for scalable business models.

There are four commonly applied business models for monetisation. Often, a comprehensive data monetisation strategy includes the deployment of multiple business models in order to effectively serve specific internal constituents and/or external customers (KPMG, September 2015):

- Return On Advantage Model;
- Premium Service Model;
- Differentiator Model;
- Syndication Model.

Another division indicates seven basic monetisation methods in the context of digital business models. – Table 6-1.

Table 6-1. 7 Business Models for Monetising Digital Content.

Just free	"Just free" is a legitimate business model, though not a sustainable one. Many start-ups charge nothing in order to get a critical mass of users before figuring out how to profit (for example Twitter in its early years). While it's not a viable long-term strategy, it can make sense in the short term. Simply free may also be a way to drive sales in another channel. For example, the software is free, but the company makes money on services and/or sister products.
Subscriptions	The subscription model is common for all types of digital content – software, gaming, newspaper, magazine, telco services and streaming content (Netflix, Hulu, Spotify). Many of these types of content use paywalls. Paywalls may be presented immediately, after a free trial, or be "metered," appearing after a certain number of page views or content views/listens.
Microtransactions	Microtransactions are what they sound like, piece-meal access to digital content and applications, being either pay-to-play (streaming content, time-limited access to content or applications) or pay-to-own (download a track, movie, article, image, etc.) This model pre-dates the common use of the Internet, pay-per-view movies and sports and arcade games. iTunes is a prime example of a microtransaction model.
Freemium	The hallmark of freemium is offering free and paid (premium) versions. There are a few variations of this model: Free and paid version (e.g. lite use and power use, personal vs. business use, ad-supported vs. ad-free, basic vs. enhanced features, etc.) Free with in-product transactions (e.g. virtual goods and currency in-game. Free and premium with microtransactions (buy ad-free Angry Birds, buy levels and goods within the game).

Affiliate	Providing everyone with unlimited tagging widens its opportunity for affiliate revenue. More tags = wider funnel.
Licensing	There are many examples of licensing digital goods (Netflix).
Derivative products	Pieces of content can be remixed into new products, or derivative products, used internally or licensed to developers.

Source: Own study based on https://www.getelastic.com/7-business-models-for-monetizing-digital-content.

The examples presented confirm that the fundamental goal of the designed business models, despite their social values and them often being embedded in new social theories, is financial monetisation.

3. The monetisation and profitability of digital business models

The context of scientific research in the area of the monetisation and profitability of digital economy business models results from the elimination of the research gap in the identification of factors responsible for the effective transformation of assets into cash. The following basic questions can be posed:

1. What factors determine the achievement of the ability to monetise digital business models?
2. What is the relationship between the monetisation of the business model and its profitability?
3. What is the relationship between the foundation of the business and monetisation?
4. What is the relationship between the number of customers served and the monetisation of the business model?

Such questions require extensive research and analysis focused on showing which factors determine the achievement of the business model's ability to monetise, why and in what business and social context.

Based on the review of the relevant literature and the observation of market behaviours and aspirations of contemporary enterprises, the concept of an original financial proposal for the triad of the business model was developed, Figure 6-4.

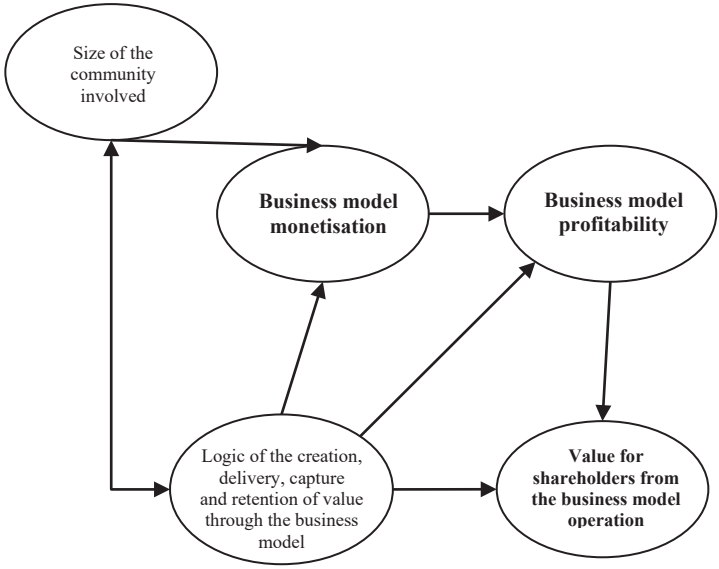

Fig. 6-4. The financial triad of the sharing economy business model.
Source: Own study.

The triad consists of three financial aspects, namely monetisation, building profitability and business model values, the results of which depend on two fundamental variables, such as the size of the community involved and the logic of the creation, delivery, capture and retention of value. This concept is based on the assumption that the starting point for the business model's ability to monetise is the logic of creation, delivery, capture and retention of value through the functionalities of the business model built into its structure. The condition of retaining this logic is building a business community around the business model. The size of this community, and its scale of impact on revenues, monetises the business model. This creates the conditions for achieving profitability, which contributes to increasing value for shareholders using the business model. In the case of the digital economy, and in particular the sharing economy, this value-oriented business model logic should additionally create social values, which should be positively perceived by participants in the sharing process by means of this business model. In this way, the volume of the community can grow dynamically.

In order to clarify the assumptions made in this chapter, an analysis was conducted of three key actors of the global sharing economy market.

As part of the profitability analysis, the factors responsible for the monetisation of business models for Airbnb, Uber and Lyft were identified. A critical analysis was conducted, and is described below.

Based on the analysis of the results of key companies representing business models operating in the sharing economy, namely Airbnb, Uber and Lyft, there is a key problem in ensuring the monetisation of business models leading to profitability, despite the large numbers of users which these platforms have. It means that these models are not scalable, and at the same time are volatile. Legal requirements in individual countries where the companies plan to expand lead to volatility in their business models and subsequently to losses. This may happen to Airbnb, which is currently profitable, but legal changes in individual countries may lead to losses. It is not only external factors which pose threats that lead to losses, but also the economic incoherence of some components of business models. The quality of services provided by suppliers is often low (drivers of private cars, hosts in private houses and apartments), which is the result of low financial incentives from the service activator. The protests of Uber drivers are clear evidence of this. It seems right to say that new business models operating in the sharing economy have a strategic problem, which is the monetisation of the business model and the achievement of profit, despite a number of positive social aspects of this form of activity. In the context of solving the scientific problem, this is a key challenge in the search for theoretical and practical methods of resolving this deadlock. Then perhaps it will be reasonable to talk about a real revolution in the area of sharing resources and digitisation and their impact on the contemporary paradigms of economics and management.

Conclusion

In the context of the research questions posed, an attempt was made to solve some key problems regarding the relationship between the monetisation, profitability and value of business models of digital economy companies. Another important issue is a change in the model of the approach of sharing economy companies, which undermine the existing state of affairs in the context of the free market economy, in many cases without generating operating profits. The example of Uber indicates that this company, although it has revolutionised the transportation of people and has made the service more readily available due to the price and the service by means of an IT application since its launch in 2010, has not registered any profit from its activity. Therefore, the identification of factors that determine the ability to monetise sharing economy business

models, their profitability, and the relationship between the foundation of the business and monetisation are issues that require attention in the theoretical and application context. Many creators of business models focus primarily on building a community focused on the activity of a specific business model to later monetise it, make profits and build value for shareholders. Therefore, it should be noted that research into selected sharing economy companies proved the use of the reverse approach to building relationships with stakeholders. The community are the key stakeholders, who the success of the entire enterprise depends on, and there is thus a need to expand its size to make attempts to monetise business models in the subsequent stages of development. It seems right to say that the critical parameter for the development of these companies is the identification of the point during the course of their development at which the size of the community around the business model is so large and stable that it is possible to monetise the business model, which should be a signal to investors that there is a chance that their investment outlays will reach the expected rate of return in future. With the financial success of Airbnb and the contrasting problems with the monetisation of the Uber business model, we may see that this issue is not unambiguous and requires further research.

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CHAPTER 7

SUSTAINABLE MARKETING MIX OF PHARMACEUTICAL COMPANIES

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Abstract

The pharmaceutical market is considered one of the most profitable and innovative in the world. It is very stable and not sensitive to the turmoil associated with economic crises. It must, however, meet the needs of humanity associated with global health problems and social expectations. The current trends require pharmaceutical companies to focus on social and environmental activities while maintaining economic rationality. Therefore, these entities in particular are obliged to manage the ideals of sustainable development. In order to meet market demand, the

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companies are forced to undertake sustainable activities in all aspects of management operations, including in marketing activity. The aim of the study is to present the possibilities of implementing a sustainable marketing mix for pharmaceutical companies in terms of the specifics of the industry and the drug market. This paper provides an overview of the literature. Pharmaceutical companies realising their goals according to the concept of sustainable marketing can contribute to the development of a competitive advantage on the pharmaceutical market.

Introduction

Development forecasts for the medicines market are optimistic due to world population growth and demographic trends which reveal an aging society. A significant increase in the population from 7.2 billion in 2014 to approx. 9.6 - 12.3 billion by the end of the 21st century is predicted (Newsweek Polska, 2018). In Poland, it is estimated that the percentage of the population over 65 years of age will amount to a total of 30.7% in 2050, while in 2013 the corresponding figure was only 14.7%. Furthermore, the average life expectancy is dynamically increasing (GUS, 2018). This presents new challenges to public health and health policy as it pertains to senior citizens. This should also lead to changes in the operations of commercial actors on the drugs market. Pharmaceutical companies should bear in mind not only profit, brought about by strongly increasing demand for medical products, but also the will to achieve socially useful goals while respecting the environment. The implementation of a triad of business goals by pharmaceutical companies - social, economic and environmental - would be compatible with sustainable development. Pharmaceutical companies, wishing to achieve market success and consistent with the expectations of current and future generations, should direct their management activities, including marketing, towards sustainable development. The aim of the study is to present the possibilities of implementing a sustainable marketing mix for pharmaceutical companies in terms of the specifics of the industry and drug market.

1. Materials and Methods

This paper provides an overview of the literature. It was elaborated on the basis of an analysis of secondary sources – studies of literature such as books, scientific journals, research reports and electronic publications.

2. The specificity of the drug market

The pharmaceutical industry is recognised as one of the most profitable industries, and is of great importance to the economy. The Central Statistical Office reports that the pharmaceutical industry in Poland is one of the leaders in innovation, comprising 40.5% of the entire field across all industries (Producenci Leków, 2017). According to IMS Health data, global revenues of the pharmaceutical industry are likely to reach 1.3 trillion dollars in 2018. The Global Life Sciences Outlook report puts the amount as high as 1.6 trillion dollars. At the end of 2015, the value of the Polish pharmaceutical market amounted to 7,86 billion USD (4.8% more than in 2014) (PharmaExpert, 2015).

The pharmaceutical market is concentrated around several important groups of entities: drug manufacturers, wholesalers, pharmacies, patients and medical staff, all of which influence its functioning. The entire sector is supervised by the state, which is responsible for the quality of health care and access to medical treatment. This market is the most regulated market throughout the economy on every level (Rdes & Syrkiewicz-Świtała, 2010). The process of drug research is tightly controlled. An identical situation can be seen in the production process, marketing, registration and patenting. Through a system of reimbursement, the legislator affects the price of the medicinal product. Thus, the demand for a drug depends on the decision to place a product on the list of reimbursable drugs. At the end of this sequence is strict control during the process of distribution and promotion of the drug. The pharmaceutical market in Poland is regulated by the Pharmaceutical Law (Dz.U., 2001) and the Reimbursement Act (Dz.U., 2011). The pharmaceutical industry operates according to the market mechanism. There is competition among pharmaceutical companies, wholesalers and pharmacies (Czerw, 2010). In addition to the legal regulations, there are also valid codes of ethical conduct in the pharmaceutical industry (Kuzior, 2007).

Other regulations apply to a group of medicines available without a prescription – so-called OTC. These drugs are not only available in pharmacies and pharmacy outlets, but can be purchased in non-pharmacy outlets, herbal shops, shopping areas, traffic kiosks, gas stations, and drugstores. This area is governed by the regulations of the Minister of Health (RMZ, 2009; RMZ, 2010). The Office for the Registration of Medicinal Products, Medical Devices and Biocidal Products permits the trade of OTC drugs. Supplements are supervised by the Chief Sanitary Inspector. The ordinance regulates which active ingredients may be used in trade outside the pharmacy and what conditions should be guaranteed

for storing. These are mainly analgesics and antipyretics, remedies for colds, sore throats and coughs, vitamins, food supplements and anti-allergic medication (Koligat, 2018).

The target recipient of the medicinal product is a patient who is a specific customer due to the relatively limited access to the "goods". The company that manufactures a drug must consider that while the choice of prescriptions drug (Rx) is prescribed by a doctor, when there is a medicinal product OTC (over-the-counter) purchase, a patient (or rather a client) considers several elements such as price, advertising, the opinion of the pharmacist, friends, or even information found on the Internet (Holecki & Syrkiewicz-Świtała et al., 2013). Therefore, pharmaceutical companies direct their medical representatives directly to people acting as intermediaries in the sale of medicine or doctors and pharmacists due to the fact that they can influence the choice of drug used by patients (Syrkiewicz-Świtała & Holecki et al., 2015).

3. The essence of sustainable marketing

Marketing, in the most general terms, refers to two areas – it is a set of rules of the company on the market, and at the same time is an organisational function which is subject to conscious management (Altkorn, 2006). The aim of marketing is to constantly follow the changing realities of the market. The company is somehow forced to constantly adapt to the changing environment in which it operates. This coercion is a direct result of the nature of the free market economy and full responsibility for the property which a company has. Companies which no longer reflect the changing needs of their customers - especially in the long term - are forced out of business and go bankrupt. On this basis, it is possible to risk a statement that each company is forced to act reactively. However, this does not fully describe what is taking place in the socio-economic reality of the 21st century. Economic activity is not only limited by the inspiration that comes from the market. There is also the opportunity for a company to actively shape the environment. In business marketing, the manager traders are also able to convey the message of social or ecological overtones. This may be inspired by the management staff who, in accordance with their view of the world, feel the need for an active commitment to the relevant concerns and issues. That mechanism is an example of realising the concept of sustainable marketing, or broader sustainable economic development.

Sustainable marketing is defined as any activities aimed at the development, planning, manufacture, promotion and sale of goods and to

help maintain a positive relationship with the buyer (customer) in terms of profitability and competitiveness, and with respect for the social utility and environment supporting the improvement of quality of life (Niedzielska, 2014). It clarifies that its essence is to maintain a balance between the economic, ecological and social effects of marketing activities throughout the life cycle of the product (Pabian, 2013). It is defined as "the process of creating, communicating and delivering value to consumers in a way that protects and enhances the natural (environmental) and human capital" (Pabian, 2013). Other researchers of this marketing concept define it similarly (among others: Betz & Peattie, 2009; Fuller, 1999; Kadirow, 2010; Leitner, 2010; Martin & Schouten, 2012).

Sustainable marketing is therefore a balanced integration of the economic, ecological and social dimensions of the activities of a company (Trojanowski, 2015; Zaremba-Warnke, 2015). According to the principles of sustainable marketing, meeting the present consumer's needs cannot in any way cause a reduction in the consumption level of future generations (Pabian, 2010). There is pressure on a company to ensure the safety of users of the product, while a manufactured product should have as little environmental load as possible - in other words, it should be recycled (Trojanowski, 2014). These activities must be conducted in each area of marketing - the sustainable marketing mix. This must be done in terms of the entire group of its components, namely in the creation of product strategy, pricing, distribution and promotion (Pabian, 2013).

An indispensable element of a free transition from traditional marketing to sustainable marketing is the introduction and development of innovations at every stage of management (Skowron & Szymoniuk, 2014). This is both a challenge and a potential opportunity for pharmaceutical companies. It is worth noting that the market for medicines is one of the most innovative markets. Effective strategy in this regard may even contribute to the improvement of profitability ratios, however bearing in mind respect for the environment and meeting the needs of society (Zajkowska, 2015). Pharmamarketing affects customers using strategies that the drug companies and their intermediaries apply using the marketing mix. The selection of the elements affecting the market is important. The so-called 4P concept takes elements such as product, price, place (distribution) and promotion (Niedzielska & Syrkiewicz-Świtała, 2011) into account.

4. The product in the sustainable marketing mix of pharmaceutical companies

The product is all that a pharmaceutical company offers: medicinal products, plants, homeopathics, dietary supplements, dermocosmetics, dressings and hygienics, and herbs to meet patients' needs. The main features that define the product are brand, quality and packaging (Czerw, 2010).

A product with sustainable character should be characterised by reliability and good quality during the period of its use. The production process should be focused on the most efficient use and the use of all resources: capital, material and human (Pabian, 2013). It should be useful, durable and above all safe for consumers, so in the case of pharmaceutical products, it should not endanger the lives of patients and lead to injury. The product package should be sustainable, environmentally friendly and either biodegradable or possible to use in recycling (Trojanowski, 2015). The product should be consistent with sustainable development. (Niedzielska, 2014). Medicines are specific products and they cannot always maintain all elements of a triad of sustainable development, but they represent economic and social value. This applies mainly to the packaging, which is to fulfil the task of protecting chemical drugs against harmful weather conditions, allowing them to maintain their full medicinal value. If a product is manufactured and is not ecological but its production is socially desirable, it should not be strictly excluded from the group of sustainable products (an example might be the only available medicine for a specific disease). The problem may also apply to the disposal of drugs, which can be dangerous for people and the environment after exceeding their shelf life. Another aspect may be when the drug meets the requirements of environmental and economic purposes and is useful in treating a disease, but it causes side effects that can be dangerous to the health of a patient in another area. All this, however, should not eliminate it from the group of products considered balanced, because its biggest strength and a superior advantage is its value in use, helping to save a life or serving in the healing process.

Brands create elements such as the name, trademark and design of a product, which distinguishes the product from other products, gives a sense of prestige, gives a sense of the benefits of the purchase, and offers information about the quality and high standard of a product. The creation and management of a brand in marketing is significant. Using the Internet to create a global brand is much faster. By these means, one can also educate consumers about a brand that cares about sustainability and

showcases their achievements in this area (Kuzior, 2007). Pharmaceutical companies are racing to establish the strongest brand on the market. Newly invented products are better, stronger in action, cheaper, safer, more convenient to use and compatible with the objectives of sustainable development, so they are socially, ecologically and economically desirable. Possession of a valuable brand is very beneficial, giving an advantage in price competition and strengthening the relationship with the customer.

Building a brand is a long-term process. It begins with segmentation of the market, as well as the identification of the needs of a prospective buyer. Subsequently, the objectives and target market are determined. The blocks that build and strengthen a brand on the basis of the pyramid of Luskin are (Garbarski, 2011): brand identity, positioning and recognition, image, propensity to purchase, trial purchase, verification of the presented image with actual benefits, consumer satisfaction and confidence in the brand and recommendation. Each of these elements can be analysed by buyers in terms of the concept of sustainable development.

Quality affects the functionality and value of a product and customer satisfaction. Most manufacturing companies use the method of quality management (total quality management, TQM) and the concept of quality in design (Quality by Design) (Prawdziwy Lek, 2014). According to the idea of sustainable marketing, special emphasis is placed on the broader product quality. It is to be useful in every aspect of the balance between profitability for the company and the benefits for the environment. It is designed to improve the quality of life (Brzustewicz, 2014). Striving to achieve the best quality requires an increase in the cost of production. Therefore, the statement "quality must cost" is correct. Maintaining high product quality while at the same time paying attention to the costs is a challenge for pharmaceutical companies, especially given increasing competition.

Product packaging is not just the protection of the product, but a real marketing tool. This mainly concerns the packaging of OTC drugs. On the packaging of Rx drugs, the issue of information is the most important (what active substance the drug contains, which dose, quantity, the manufacturer's logo, storage conditions, expiration date, and the series). In this category of drugs, packaging also plays an important role as a protective function. The drug packed in a so-called blister gives possible control over the dosage; likewise, the drug does not get air, which worsens its physicochemical properties. There are also packages that prevent opening by children. Such packages, as described earlier, are not necessarily made from organic products, but they satisfy the needs of security and usability. The packaging of medicinal products, particularly

Rx, are prevented from being opened before reaching the patient. OTC drug packaging must attract attention, be specific and recognisable, and stand out from a lot of other products on the shelf. There are an increasing number of self-service centres where pharmaceuticals are available. Therefore, all relevant information on the drug must be placed on the packaging.

In this case, the outer packaging (box) could be made of organic materials or recycled fibres, which would then make it a hallmark by which a pharmaceutical company can be viewed sympathetically by representatives of many communities. The use of environmentally friendly packaging should not significantly raise the cost of production of medicines and thus translate into an increase in their prices or reduce its quality. Additionally, in the case of packaging, it cannot be concluded that a more environmentally friendly package will be more expensive than a conventional one.

Pharmaceutical companies often change the graphics and colours on the packaging of their products. The drug companies also benefit from companies specialising in printing packaging and leaflets of medicinal products. They meet the highest standards and are equipped with the latest software, implementing the highest quality standards. An error on the packaging or in a drug leaflet can have very serious consequences, hence the importance of high-quality services including printing (Prawdziwy Lek, 2014). Pharmaceutical companies could consider whether these activities should partially be moved online to reduce the amount of paper media in promotion and education (Kuzior, 2007). It is worth mentioning that this should not significantly limit the availability of this information, as more and more people use online resources, not only among the younger generation of consumers, but also the older group aged 65+ (Syrkiewicz-Świtała, 2015).

An important element from the point of view of sustainable development is the implemented EU directive 2011/62/EU, which is to protect patients against buying counterfeit drugs. Drugs sold by prescription will be marked with a unique number and will have additional protection against opening (2D codes). Assigned numbers will be stored in a European database, which will supervise the authenticity of the product from the point of production to the pharmacy. In the European Union, serialisation is to apply from the end of 2018 or the beginning of 2019. This is another challenge which the pharmaceutical sector must meet (ŚPF, 2015).

5. Price in the sustainable marketing mix of pharmaceutical companies

The price is "the number of monetary units the purchaser must pay per unit of product" (Garbarski, 2011). Among all components of the marketing mix, price is the least sustainable. Price is an element which is extremely sensitive to market changes. In the concept of sustainable marketing, it is important that the price is adequate to the costs incurred and expresses the real value for the patient. Establishing sustainable policy rates can be difficult because the pharmaceutical companies incur additional costs related to research on the original drug, functioning in the international arena or a significant number of intermediaries involved in the distribution of drugs. In addition, unfortunately, the final price of the medical product has an additional margin component. This is the difference between the purchase price of the product and its selling price (pharmacy margin). Wholesale margin is applied by pharmaceutical wholesalers on pharmaceuticals purchased from the manufacturer, which means that the price is much higher for the final consumer. An important element in the turnover of a pharmacy is the introduction of different levels of payment for drugs prescribed by a doctor. In Poland certain groups of patients have the right to receive drugs for free. This is regulated by law. During the current year a law was signed that guarantees free medication for people over the age of 75. These are drugs included in the list announced by the Minister of Health, called the “S” list for seniors. Drug manufacturers’ intermediaries setting the level of prices and margins may follow some rules generally known in marketing literature. In terms of sustainable marketing, it is worth mentioning that in the industry described, the Internet also has an impact on the price level. When ordering drugs online, pharmacies reduce transaction costs, so finally the drugs are cheaper.

6. Place (distribution) in the sustainable marketing mix of pharmaceutical companies

Distribution is the process of movement of medicinal products from the manufacturer to the patient. Changes pertinent to this issue are also occurring on the pharmaceutical market. According to sustainable distribution, the product should be delivered to the right place and time, in perfect condition and of perfect quality. A key role in the course of medication is played by the Pharmaceutical Law and the Regulation of the Minister of Health on the procedures of Good Distribution Practice (GPD) (dated 26 July 2002). This regulation was developed by the European

Commission and describes the necessary procedures to ensure the highest product quality at all stages of distribution. The choice of intermediary distribution of drugs is no longer so obvious. More often, the alternative is a direct channel from the producer to pharmacies, bypassing pharmaceutical wholesalers and of course Internet sales. The choice of channel distribution of pharmaceuticals affects the segment of the target market, the type of drug, distribution regulations of drugs and multidirectional activities of the producer.

Rx drugs (prescribed by a doctor) are always distributed by pharmaceutical wholesalers, typical pharmacies, hospital pharmacies or pharmacy outlets. OTC (over-the-counter) can be distributed by entities apart from pharmacies (gas stations, grocery stores, herbal stores, etc.). Any company supplying drugs to points outside the pharmacy must meet the requirements of a pharmaceutical warehouse.

In terms of sustainable marketing, the adopted distribution policy and transport policy of a pharmaceutical company and all its stakeholders are important. The use of means of transport such as electric cars or hybrid vehicles will be both ecological and economical; in addition, adequately presented promotional messages can present the company's image and its brands. Furthermore, the length of the distribution channel has an effect on the final price of the drug. Therefore, pharmaceutical companies often ignore their sustainable activities intermediary (wholesaler) in the sale of expensive drugs, or if the pharmacy submits a request directly from a manufacturer of medicinal products. This method is, however, rarely used and does not apply to OTC drugs. Even if a representative of a pharmaceutical company personally visits a pharmacy in order to sell products, the order is transmitted via a pharmaceutical warehouse. The patient cannot purchase directly from the pharmaceutical manufacturer but only through intermediaries, i.e. a pharmacy or outside pharmacy points. Competition also exists between pharmaceutical wholesalers, and the possibility of achieving the objectives of sustainable business must also be kept in mind. They try their best to adapt to their customers.

The achievement of marketing objectives consists of co-operation between each element of the distribution channel. All partners want to achieve economic benefits but they are mutually dependent. On such a highly competitive pharmaceutical market, the way the company communicates with the market is very important.

7. Promotion in the sustainable marketing mix of pharmaceutical companies

The sustainable promotion of pharmaceuticals, in addition to activities consistent with those objectives (economic, ecological and social), should still have ethical, moral and legal aspects. The promotion of pharmaceuticals is the action of producers and representatives of the pharmaceutical companies directed to physicians and pharmacists, affecting their willingness to prescribe the product. Pharmacists encourage the purchase of a particular drug and doctors are willing to prescribe the drugs which they are more confident in. Sustainable marketing communication is influenced by various factors (Armstrong & Kotler, 2012): the features of pharmaceutical, legal matters, purchasing habits and the financial capacity of the individual.

Treatment with medicines (drugs) is the process of requiring knowledge by physicians and pharmacists. The promotion activities are accurately informed about the characteristics of the product (properties of the drug, dosage, side effects). Equally important is accurate information on leaflets, packaging, and websites, because contemporary patients often seek information about treatment in this way, as well as on the Internet (Syrkiewicz-Świtała & Holecki et al., 2015). In the end, the patient must have a thorough knowledge of the entire treatment process.

Elements of the sustainable promotion mix are (Pabian, 2013): advertising, direct marketing, sales promotion, public relations and promotion of personal selling processes. Its carriers can be basic media: press, radio, television and the Internet. In terms of sustainable promotion, A. Pabian ranks the press worst, and the Internet the best (Pabian, 2013). Currently, most of these elements of the sustainable promotion mix can be used on-line with no restrictions. The Internet gives the opportunity to each company on the local market and internationally. This is done via the website, social networking sites, email and advertising banners placed on search engines, portals, blogs, etc. (Moroz & Syrkiewicz-Świtała, 2011)

Advertising a medicinal product is "the activity of informing and encouraging the use of the medicinal product, aimed at increasing: the number of prescriptions, supply, sale or consumption of medicinal products." (Dz.U., 2011). In general, pharmaceutical advertising can be divided into product advertising and company advertising. The former is to create a brand, a product, and shape consumer purchasing preferences. Advertising is expected to present the best side of a product and to encourage its purchase. By contrast, the advertising of companies aims to promote the company and present it in a good light. In both cases it is

possible to use such forms and means of promotional activities which will be in accordance with social needs, provide relevant benefits to the company and seek to ensure respect for the environment. In addition, prepared information messages to all audiences disseminate information on the application of the principles of sustainable development throughout the life cycle of the product in a fair and truthful way. Pharmaceutical companies use this type of advertising, usually by means of a website or YouTube platform.

A medicinal product is based on a specific chemical substance, whose mission is to improve the health status of the patient. Each drug can cause side effects; however, the presence of balanced pharmaceutical advertising must comply with the current guidelines of the Ministry of Health, i.e. (RMZ, 2008):

- the information about the drug must be reliable and consistent with the summary of product characteristics, not misleading, and cannot be addressed to children,
- any drug that does not have marketing authorisation in the Republic of Poland cannot be advertised,
- advertising Rx drugs is prohibited (including psychotropic drugs). The message may reach medical personnel only,
- a drug may not be advertised by a person who is a professional doctor or pharmacist.

The Main Pharmaceutical Inspector (GIF) is responsible for the observance of the guidelines of advertising supervision in Poland. The Minister of Health obliges companies to place the following information in the advertising of a medicinal product: "Before use, read the content of the package leaflet or consult your doctor or pharmacist, as each drug used improperly may threaten your life or health." (RMZ, 2008). In terms of advertising of medicines, Polish law is consistent with EU law.

Sales promotion in terms of sustainability on the pharmaceutical market takes the form of additional promotion, which increases the attractiveness of the product and increases the desire to buy. It is a short-term tool. The aim of such a promotion is to increase sales of the drug; the introduction of a new product; complementation of information about the drug; or the increase of own sales. A key role is played here by medical representatives and pharmacists, who have a significant impact on sales of the product. The way they present a drug results in the course of the transaction. The sales promotion is a unique opportunity, in a sense, so

typically it is used periodically, e.g. to celebrate the holidays or during a particular season.

Public relations are the creation of good business relations with the environment, creating a positive image of the company and crisis management. Positive publicity is desirable for a company. Pharmaceutical companies depend on being recognised as partners for physicians, pharmacists, patients, politicians, etc. The message of sustainable PR is to pay attention to the company's operations in line with the balance of social and ecological factors, while achieving the expected profit from the sale of its products. Parallel to advertising products placed ubiquitously in the media, PR departments use media relations to disseminate information on their activities in accordance with the concept of corporate social responsibility (describing the charity or sponsorship to improve the welfare of local communities), all to maintain local and international relations with the environment.

In the Internet era, PR departments have facilitated the task by reaching out to a mass number of receivers using the "one-click" strategy. Pharmaceutical companies often create an image of the company through entries on social networks, or videos on YouTube. These are events related to the nature of the company, the course of the research, charity, counselling and others. All this affects the "image" in the eyes of the customers.

Personal promotion in sales processes is the oldest form of promotion. There is direct contact between the producer or salesmen and the customer. A connector is a trained medical, pharmaceutical or commercial representative. Given the limitations and the advertising of pharmaceuticals, personal sales in the pharmaceutical industry play a key role. Medical representatives mainly focus on commercial relationships with physicians or pharmacists. They provide comprehensive knowledge of the medicines in question; therefore, such a person must have vast knowledge and the ability to communicate information. This is a very important function, as it has an impact on the success of the promotion, the consolidation of contact with the customer and the image of the company. After the tightening of the Pharmaceutical Law, relations in this field have been somewhat limited.

Direct marketing is an immediate message to a specific person. Its main feature is interactivity, which determines the quick contact with the customer and the opportunity to receive an immediate response. It gives the ability to maintain long-term relationships with customers. Sustainable direct marketing largely uses the tools of e-marketing, which is the fastest-

developing such method on the drug market in recent years (Moroz & Syrkiewicz-Świtała, 2011).

Discussion

The use of practices derived from sustainable marketing is rapidly developing, due to the simple fact of increasing eco-social problems of our planet (Trojanowski, 2014). The fact is that a steady increase in the population and a rapidly aging society (especially in Europe) is currently one of the biggest global problems. The increase in both of these phenomena directly leads to increased consumption and production of drugs on the market. The implementation of the idea of sustainable development through the management activities of pharmaceutical companies will be ecologically and socially desirable. However, for the same companies, the implementation of strategies for sustainable marketing can contribute to improving the perception of all groups of stakeholders.

The pharmaceutical market is highly regulated, and the tasks of sustainable marketing are therefore strongly conditioned by legislation. Many marketing tools are illegal. More personalised forms, based on reliable information, are acceptable. In this case, the Internet has become the most popular field of activity. This is an additional positive aspect of the social network where the virtual world also becomes a tool for cooperation and collaboration between entities located in different places around the globe (Prandecki & Nawrot et al., 2013). This provides the opportunity to initiate and implement activities aimed at global public health problems, e.g. aging. Such activities may be implemented both through promoting products manufactured in accordance with the principles of sustainable development, and also all social activities that deal with education, prevention and health promotion. By taking such decisions, pharmaceutical companies embody the realisation of their sustainable marketing objectives, which may contribute to their strategic competitive advantage on the drug market now and in the future.

Conclusions

Pharmaceutical companies, through the implementation of the concept of sustainable marketing, participate in the process of creating, communicating and delivering value to their consumers. They do it in such a way that protects and strengthens natural, social and human capital. The use of this concept in a natural way offers a balance between obtaining profits for the company and the pro-social value associated with broadly

understood health protection. Pharmaceutical companies which realise their goals according to the concept of sustainable marketing can contribute to the development of a competitive advantage on the pharmaceutical market.

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Author Contributions
MSŚ conceived the study and prepared the draft of the paper. MSŚ, RŚ and PR contributed to the preparation of the paper and study. JK and EP provided new information which was necessary in the revision of the paper.

Conflict of interests
The authors declare no conflicts of interest. The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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CHAPTER 8

TOKENISATION AS THE SPECIFIC DIGITALISATION OF BUSINESS MODELS

MAREK JABŁOŃSKI[1], PIOTR JANULEK[2]

Introduction

Entrepreneurs are interested in finding an optimal communication and collaboration system which can generate additional value for customers, redefining the business model anew in the context of emerging technological opportunities. In terms of technological paradigms which are suitable for contemporary business conditions (such as the Internet of Things, Big Data, etc.), we are witnessing the transformation of traditional business models into digital models. So far, management theory has left the gap open; researchers have attempted to fill it by analysing digitalisation in business models. This section aims to identify and discuss the results of desk research into the potential application of tokenisation in designing innovative business models. As part of broader-scope research into the digitalisation of business models, in this part of the research the authors address modern forms of crowdfunding, investment in assets, digital residency, the specificity of smart contracts and opportunities to monitor the supply chain. In this way, an outline of the concept for the application of tokenisation to the digital transformation of business models emerges.

In the first part of the paper, the authors offer a closer view of the theory of the digitalisation process in terms of the advantages of tokenisation in business models. The potential application and importance of blockchain-based technology in the information ecosystem has been proposed. The research part analyses the source, i.e. The White Paper, a

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variation of a prospectus at the stage of preparation and incubation of business models. The paper ends with recommended configurations of business models in digital transportation based on tokenisation.

1. Digitalisation of enterprise business models - theory and practice

Digitalisation is the use of digital technologies to change the traditional analogue formula of a business model and provide new revenue and value generation opportunities through the digitalisation process. It is a process of moving towards digital business (Gartner, Inc., 2018). The concept encompasses B2B, B2C and B2government relations, etc. Digitalisation leading to internationalisation and flexibility in offering remote services resulting from the availability of the opportunities which come with information technologies are the leading trends in contemporary business. However, it is not about digitalisation, as it is a process of transforming information from a physical to a digital format. The design of business models comes with the digitalisation of the rationale for application which is a process that uses digitalisation to optimise a value proposition. Business model configuration is a derivative of the process. An increasing number of organisations are embarking on the digitalisation of their business model, even including very traditional ones. This is implied by the number of adjustments in the existing business models in order to cope with new technologies. One solution which increases opportunities for business models by creating added value from technology is tokenisation.

Tokenisation is a specific form of digitalisation based on token contracts (otherwise known as self-executing contracts, blockchain contracts, or digital contracts) using blockchain technology. In the era of digital technology development, enterprises are interested in finding natural, free, uncensored platforms for communication and collaboration. The knowledge ecosystem emerging from the process is natural, democratic and capable of rapid changes. The system is comprised of entities and their know-how which, as a resource, is a finite and valuable asset. Knowledge is the outcome of managing a stream of information and a system creates a chain of mutual relations built in both virtual and non-virtual dimensions (Gryczka, 2013, p. 86). The opportunities which come with blockchain technology set out new spaces for designing effective digital economy business models.

2. Blockchain technology as a method for the continuation of enterprise business models

Blockchain technology may be effectively used to configure business models. An attempt to develop some prerequisites for such business models requires the definition of the key attributes of its components.

Blockchain is the name of an advanced tool based on databases. It is scalable and made up of many nodes, and is a complex system with a high degree of fragmentation. Technological progress is an iterative process; for this reason, the key to understanding blockchain is to remember that it has evolved from a decentralised application (DApp). It is assumed that DApp is an application used by many users in a decentralised chain to automate business processes and process data. The structure helps to avoid the failure of a single node in a chain. DApps become a new programming paradigm. One could say that, from the technical point of view, the app works very much like a website; however, its back-end part is performed in peer-to-peer (P2P) networks and not via servers (Filipova, 2018, p. 83). Applications have tokens which reward participants for supplying the computational power.

Tokens are measurable outcomes of blockchain technology. The rules for token generation are laid down in the token contract. A token contract is a specific type of a smart contract which, with a contract code, describes the rules of transmitting between addresses i.e. whether the transfer is exchangeable, split, etc. A token does not exist without a contract. The name of a contract is the name of the token. Blockchain technology allows for the creation of tokens which are the equivalents of various resources.

Smart contracts are an IT script based on an advanced cryptographic technology which exercises a code-embedded contract (US Senate Joint Economic Committee, 2018, p. 220). The key word in a code is the contract and not the token. In this format, contracts are stored and replicated in the system and monitored by a computer network with blockchain on. (Smart Contracts: The Blockchain Technology That Will Replace Lawyers). At present, the blockchains which can be used for smart contract processing are Bitcoin, Side Chains, NXT, Ethereum etc.

The configuration of business models based on blockchain, tokens and smart contracts are the springboard for building a new value chain based on attributes of these thematic areas. The configuration of business models in this aspect may be applicable in numerous areas of the economy characterised by a high degree of digitalisation of a sector or industry.

3. Tokenisation of enterprises - current applications

Tokens may be used to create new opportunities in the process of designing digital business models. These may include more effective and broader crowdfunding with tokens. So-called crowdfunding may be used to raise funds directly from investors around the world. Entrepreneurs may raise funds from the general public via an Initial Coin Offering (ICO). Similarly to a standard issuer creating a prospectus for an IPO, in the case of an ICO offer, a cryptography-based process is identified. Process tokens are created on a chosen platform and subsequently sold to investors in exchange for funds (Nguyen, 2018, p. 17). The business model of such an initiated enterprise is described in a White Paper which is the equivalent of a prospectus published by the issuer for the Initial Public Offering (IPO). Typically, attractive investment opportunities are not equally accessible to all investors. Tradition had it that only processional and accredited investors could see and invest in projects at the pre-product stage. In addition, there is the issue of tax regulations which restrict e.g. US entities' efforts to raise funds from investors outside the USA. The ICO is helpful in optimising actions in such conditions.

Blockchain-based tokens have become a new type of asset and have started attracting investors (Chen, 2018, p. 572). Intelligent contracts can be used to expand one's asset portfolio by reducing agency costs significantly. Technology-driven companies have clear potential for diversifying their asset portfolios owing to their high liquidity, lower transaction costs and enhanced transparency. By using such systems as Meacenas.co, average investors (not only HNWI - High-net-worth individuals) may hold a portfolio of assets with art value. Meacenas.co declares its intention to create Art Vaults, improving the visibility of many works of art which are currently stored in warehouses and were fully kept from the general public, which is an innovation in itself (Analysis of Maecenas ICO – Decentralised Art Investment Platform, 2018). Owing to such an ecosystem of information, enterprises may potentially provide a new dimension of transparency for the art trading sector.

Optimising business location is yet another example of tokenisation. Thanks to the e-Residency system supported by the Republic of Estonia, an enterprise may operate independently from its location. E-Residency offers full access to the advanced digital infrastructure of Estonia and to the same rights in business as the rights enjoyed by citizens of Estonia. The system gives the freedom of operating a global, EU-based business from any global location as well as optimising the administrative and fiscal costs. An Estonian company is an EU company so the enterprise will

automatically operate on a large market. First, border services verify the identity of the applicant. Next, the company is registered and, in practice, each business partner may verify the legality of its operation. Owing to the e-Residency and by means of obtaining an ID Card, the enterprise enters a blockchain-based ecosystem of information. Owing to an easier start and remote management of a global business, it may change the shape of its business model. The concept is based on the so-called sovereign identity. The idea is supported by the belief that people and enterprises may store their own identity data on their own devices and effectively provide it to those who must verify them, while not referring to the central repository of personal details (Chen, 2018, pp. 574–75).

The transparency of smart contracts is an important aspect of the approach. A smart contract is a contract between two parties, performed on the basis of a set of predefined instructions. The contract not only defines the rules and contractual penalties, but it also automatically enforces delivery on the obligations (e.g. Ricardian Contract). Smart contracts help to exchange money, real estate and property, shares or any objects or items of value in a transparent and safe manner, without the need for the services of an intermediary. The REQ system allows users to create smart order documents to demand and receive payments safely. The XRP system makes it possible to trade and follow many currencies in a single, decentralised net. Other typical functions include servicing payment channels and the escrow function, which makes it possible to send out and receive contingent payments.

Another aspect is monitoring the supply chain, which may be more effective owing to the technology. Not all present solutions are clear, coherent and credible for clients and, in this case, prosumers. Encrypted data offers extensive information, which is given practically in real time, about the current location and the origin of goods: whether they are in production, shipped, distributed, etc. The number of interactions caused by sensors (from production to store shelves) may even disrupt the long tail model which many organisations consider a paradigm. The supply chain process has many stages which require the application of a collaboration-based approach from interested parties. By using blockchain technology, one may streamline the process by combining the entire supply process with the power of smart contracts. In the ecosystem of information, some new interactions come into life: from monitoring, payment management and efficiency analysis. The shortening of the value chain may be the source of new value and the power driving new business models. Professional consumers want a greater degree of control over the origin and chemical composition of a product. The documentation of different

parties in the supply chain is not inwardly consistent, as certain information continues to be lost. Some unauthorised interference in information contained in the supply chain arises. Owing to the ecosystem of information based on a dispersed network, these drawbacks may be partially eliminated. Table 8-1 offers a synthesis of the issues in the context of the added value generated by using a specific form of digitalisation i.e. tokenisation.

Table 8-1. Added value generated by tokenisation.

	Without tokens	With tokens
Crowdfunding	Post-product. Typically, open source projects do not share their success with programmers.	Pre-products. More internationalised. Entrepreneurs can raise funds by organising their ICO.
Residency	Fully digital.	Fully automated.
Investing	With agents. Often limited to HNWI investors.	No intermediaries. More democratic. Tokens a new type of desired assets.
Contrasts	With agents.	No intermediaries. Automatically enforces these obligations.
Supply Chains	Documentation is not coherent. No social control.	Trusted. Monitored. Socially controlled.

Source: Chen, Y. 2018. Blockchain tokens and the potential democratisation of entrepreneurship and innovation. Business Horizons, vol. 61, no. 4, 567–75.)

4. Conceptualisation of assumptions for designing tokenisation-based business models

Aspects of tokenisation-based digital transformation covered in the paper may change the business models of these enterprises (Chen, 2018, p. 568). It is blockchain applications, and not the IT infrastructure, that offer the biggest potential. Blockchain works both as a distributed and

fragmented identity system, a dispersed information platform, a dispersed collaboration network, a new form of fundraising and a dispersed community. In practice, there is an industry-specific application of tokenisation for each industry. Together, it creates the infrastructure for the ecosystem of information. Owing to an advanced, cryptography-based technology, the ecosystem of information expands, covering an integrated programming environment which makes it possible for people without any experience to create smart contracts on a blockchain of their choice. This way entrepreneurs and, in particular, professional services companies can learn fast, check by training and implement new products and services (machine learning models, cloud solutions, etc.), such as projects including IBM blockchain, Microsoft Azure, BlockIDE, and so on. Even Microsoft itself, according to its vision, intends to help companies to grow in the era of safe, multi-lateral calculations by providing open, scalable platforms and services which may be used by each company to create new value (Rose, 2017). Fig. 8-1 shows an enterprise in the blockchain-based ecosystem of information.

Digitisation concentrates on data and information, and focuses on delivering additional value from knowledge and relations which are a derivative of information. The creation of additional value requires the configuration of a business model based on the ecosystem of information. Such a decentralised network may be a source of new value which facilitates the process of building a community of users.

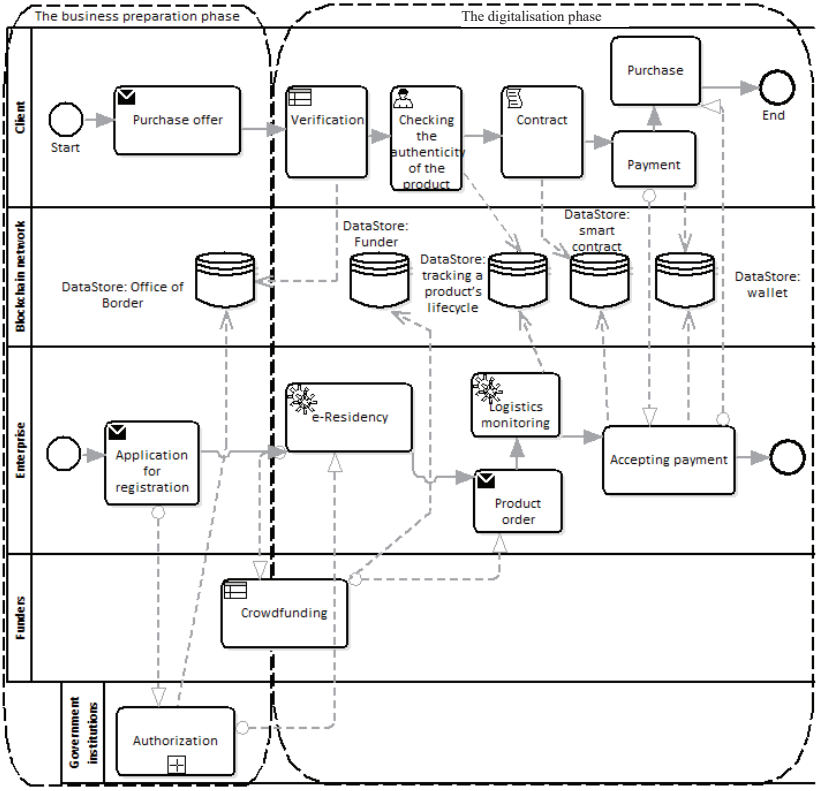

Fig. 8-1. Enterprise in the blockchain-based ecosystem of information (source: own)

5. Key limitation to surveying the applicability of tokenisation processes to business model design - configuration recommendations

Effective digitisation requires a detailed revision of the business model. When an organisation or its models are digitalised, it implies a number of issues and challenges for managing the transfer (transformation). The transaction costs - the reduction of which is promised by blockchain - may be significantly lower, which is an innovation *per se*. However, things do not need to turn out that way. The cost of a transaction may be replaced by the cost of another one.

The majority of industries have only just begun penetrating opportunities for applying tokenisation in practice.

For enterprises, innovation is usually a new or significantly changed business model and not the technology itself. Therefore, in this respect, one should pay attention to new or significant changes to business models brought about by blockchain. A crisis of technology followed by a crisis of trust may even be, as we know from history, a good stimulator of innovation (Szpringer, 2019, p. 25). Having partners who enter into business transactions without mutual trust is an optimum setting for the use of blockchain. Innovations do not necessarily stimulate a change in the model. Tokenisation may rebuild an enterprise, thus providing new business opportunities to innovative companies at the start of their operations.

Final Comments

Desk research led to the identification of new options for exchanging values in the context of the digitalisation of business models by tokenisation. According to the literature, blockchain technology may significantly reduce traditional costs of agents, reduce logistics costs and even shorten the supply chain. The optimisation of locations by using systems such as those described in the paper may reduce the costs of transaction and enhance transparency and, with that, the social control of the economic entities. The ecosystem of blockchain-based knowledge offers a transparent and verifiable system with the potential to change the way people think about exchanging values and assets.

After selected applications of tokenisation are identified and described, one may conclude that applications of tokenisation catalyse innovative business models. The abovementioned examples prove that it is technically possible to use smart contracts to manage a business model. Potentially, these contracts could replace other business contracts. It cannot be a cure for all challenges faced by businesses nowadays but it certainly shows that the rules of the game may change (Sinha, 2018). When R. S. Tomlinson[3] applied the first e-mail, he did not know that characters, information and knowledge would be transmitted on the Internet but also, in a way, entire organisations with their infrastructure, locations and assets. The ecosystem of information is a metaphor which is rightly used in this context. Basically, managing tokenisation consists of

[3] R.S. Tomlinson (1941-2016). Creator of the first e-mail and the idea of @.

understanding one's business model as a part of the ecosystem of information.

Blockchain technology is not fully perfect yet but it is very safe, independent and scalable. In particular, the issue of leaving it uncensored and its democratisation require further research. Another issue which calls for research is the distributed ledger technology (DLT), which may bring about a substantial change to the financial sector. Furthermore, Enterprise Blockchain applications are interesting, too. However, facts prove that the number of blockchains used in a real scenario is growing every day (Szewczyk, 2018, p. 577). The first tokenised business models do work and more business applications are soon to come. This is manifested by a list of tokens on the analytical platform www.etherscan.io/tokens. It is an authentic digital transformation and change of business models. Nowadays, tokenisation is a promising tool for transforming business models through transferring assets to the digital world by means of blockchain technology.

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CHAPTER 9

THERMODYNAMIC EQUILIBRIUM IN A SMALL FAMILY BUSINESS

PIOTR BARCZAK[1]

Introduction

Thermodynamic laws affect all processes which occur in the environment around us. One of the objects that is subject to these laws is a small family company, which consists of several people creating a system that is part of the economic space. A company is also a system that always comes back to equilibrium regardless of processes and running time. If this is not the case, the company disintegrates and sometimes ceases to exist. A helpful issue in the sustainability analysis of companies is group synergism and the concept of synergy, understood as a group functioning in a limited environment, operating on the basis of limited resources, both financial and biological.

1. Synergism

Synergetics is an area of research undertaken by a team of researchers under H. Haken, who observed the phenomenon of **self-organisation** occurring in various systems. He noticed that plasma components seek self-regulation, and used the term 'synergism' to describe this phenomenon. Synergism, however, is not a synergy understood by economists as creating a certain surplus resulting from positive cooperation. Synergism is the description of the **phenomena of self-regulation, self-organisation**, resulting from the existing laws of thermodynamics (Haken, 1983). According to him, synergism is a systemic system consisting of many

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subsystems with a diverse nature such as electrons, atoms, cells, molecules, neurons, photons, individual human organs, whole animals or humans. Therefore, the system constitutes the cooperation of subsystems that create the functioning of macroscopic structures through mutual conditions. Subsystems cause the self-organisation of systems, and the principles of synergism are universal and applicable in nature, including in the world of physics, thermodynamics, sociology and economics.

Similar processes occur in nature. In the physical environment that surrounds us, we observe a continuous striving to reduce the level of energy used. Matter is transformed from one state to another. Systems strive to minimise the energy used. Elements make changes from one state to another, always striving to reduce the energy of the system. As a result of the interaction of thermodynamic and physical laws, they are transformed into various crystalline forms. Each of these forms can be considered specific examples of the end of a synergistic process, as a result of which the system of elements or compounds has reached a constant value in a given environment, and in a sense, the process of crystalline self-organisation has been closed. It seems that the laws of physics also apply to synergistic systems in economics, including a small group acting jointly to achieve a specific goal.

In every situation, the system strives to use the smallest amount of internal energy. Material systems known from physics and chemistry are transformed. Depending on the conditions, graphite or diamond, or sometimes soot, may be formed from carbon. The self-organisation of elements and operations takes place based on limited resources. New features of the same elements also arise spontaneously.

Systems always revert to the state with the lowest amount of internal energy and the largest entropy. Phases are characterised by the pursuit of a minimum value of Gibbs free energy, and in the case of inanimate elements this depends on many parameters: temperature, pressure, stress, electric and magnetic fields. The state of any system using molar state functions is illustrated by the equation: G - Gibbs free energy, H - enthalpy, S - entropy, U - internal energy of the system, state parameters: p - pressure, T- temperature, V- volume.

$$G = H - T \cdot S = U - p \cdot V - T \cdot S \; (G = U + pV - TS)$$

The physical meaning of enthalpy results from the above formula. Enthalpy is equal to the sum of internal energy, i.e. energy that is needed to create a system, when it is created in a vacuum, and the product of pV,

which is equal to the work to be done over the environment. A system is created.

The spurious rule is also applicable in a limited environment. The rule of H.L. Le Châtelier says that any system that is in a state of equilibrium due to the influence of external factors undergoes a transformation limiting the action of these factors (Chatelier, 1884). The rule is general and natural. In other words, if the system is disturbed, then a change begins in the system, which counteracts the introduced imbalance leading to another state of equilibrium.

In all these processes, we have a closed system in which there is an attempt to achieve the minimum level of energy use.

2. System synergy

The concept of synergy has not been clearly defined to this day. The etymology of the word synergy refers to the word "*synergos*" meaning collaborative and more widely interacting. Aristotle claimed that the entirety was more than the sum of entireties, although in his reflections he referred to the concepts of substance, energy (Greek *energeia*), and movement (Greek *kinêsis*). According to him, a built table is more than just the wood from which it was created. Modern philosophers described the phenomenon of synergy more broadly, pointing out that if cooperating entities achieve more than each individual, we are dealing with the phenomenon of synergy. Aristotle's concept has been developed, and synergy has become a different conceptual being.

Economists use the concept of synergy quite often, trying to explain one of the ways to achieve organisational effect, which results in a surplus of benefits per each member of a team if it interacts in an organised way within the institution, in comparison with the benefit that it could achieve by acting alone - assuming the maximum possible degree of organising an individual action in each of these cases (Zieleniewski, 1982).

According to P. Corning, synergy refers to the combined effects of all kinds, with the effects being greater, the same or smaller than the sum of individual actions. However, is this type of synergy not confusing? In this case, we forget about the foundations of the creation of the word synergy, derived from Aristotle (the entirety is more than the sum of entireties), and also omit the basic definitions from the scope of management. According to R.W. Griffin, synergy occurs when two or more subsystems produce more than the total production of each of them if they worked separately [Griffin, 2006]. On the other hand, in scientific work in the field of logistics, the synergy effect is understood as an appropriate selection of

partners allowing for the use of key competences, which saves time and reduces costs (Krawczyk, 2011).

If one was to accept P. Corning's definition as the final definition, then synergy is all the phenomena that result in anything. Synergy will be the processes occurring in avalanches, as avalanche processes arise as a result of internal transformations. The transformation of water into ice is also a synergy, as is the symbiosis of plants.

According to R.W. Griffin, synergy only means that organisational units can often work more effectively when they work together than when they work separately.

N.A. Berstein attempted to find synergy in human anatomical elements. Efficiency as an important feature in the development of particular species of animals, including the human species, has become the distinguishing feature. He introduced the definition of level B, which was responsible for synergy in the human body. This level is responsible for human motor function. The first level involves impulses, and each level is responsible for the motor functions of human beings. Thanks to such organisation of the organism, synergy effects are generated between the brain and the muscles, which affect the external environment through the muscular system. This type of system developed as a result of evolution. Synergy is understood in the context of the functioning of vertebrate organisms, mostly including humans. By describing the human body, the author notices that it functions thanks to the economical delivery of energy to the system and **coordination and control** of the nervous system over the entirety of individuals. **Synergy is understood as a kind of coordination**, where the central nervous system controls the muscles of man. Muscles participate in a synergistic process. According to him, each set of muscles is flexible and specific; the sets function as self-organising units, and are locally coupled and restrictive internally, limiting the need for controllers in the body (Berstein, 1996). Muscles are stimulated from the resting state and perform more or less work. The central nervous system tries to stimulate them in such a way that the best available energy is used.

Muscle synergy is a concept widely known in clinical practice. The muscles are coordinated by the control mechanisms of the human body. Values of muscular work must be stabilised, which allows conclusions to be drawn on the subject of synergy in a wider scope thanks to the analysis of the human body (Krishnamoorthy et al., 2003).

According to M. L. Latash, there are three elements that affect synergy, among them task-dependence, which means that synergy can change reality: the hand can unscrew the lid, write with a pen, play music, and wave goodbye. A group of workers, using their hands, can build houses;

an orchestra can play music. Dead things cannot undertake such actions by themselves, but all human behaviours in relation to dead things can trigger synergistic actions. Synergy also means "common work" which leads to a goal. Synergy is sharing. If a human hand performs an action, fingers generate forces. Human fingers have properly divided actions. It is similar with human teams. Another factor is error compensation.

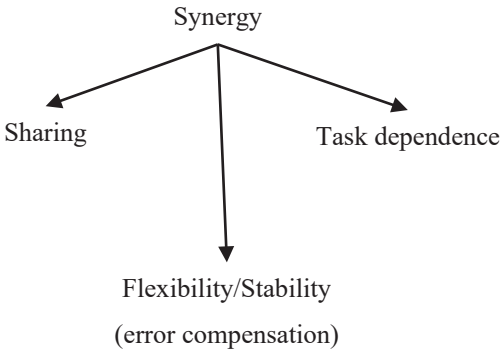

Fig. 9-1. Components of synergistic action
Source: (Mark L. Latash, Synergy, Oxford University Press, 2008, NY, p.15)

If the designated task is carried out jointly, and one of the elements stands out from the rest, other elements strive to equalise the error to achieve the assumed goal (Latash, 2008).

Antagonists, however, perceived synergies as a functional concept. This involved the use of muscle connections in the context of behavioural conditioning. Synergy in this context meant such organisation of the nervous system within which tasks are divided among the system of elementary variables, which provides cooperative variations of elementary variables in order to **stabilise** them. The model presented by the team of researchers assumes that synergy is a concept that ensures the **stability** of fingers on a hand. If one of them is weaker, another one becomes stronger. Synergy is understood as a stabilising concept, supervised by the central nervous system. It is believed that neurons in the brain may be responsible for motor function in the muscles. The fact that there is feedback between the elements of the nervous system and the muscles has been pointed out (Latash et al., 2007).

Synergy (synchronisation) was understood as a process of reducing mutual possible variances of common activity making them more similar

and regular; that is, two individuals being in mutual temporary closeness, through mutual interactions, perform more or less the same actions. Similar phenomena occur in the case of physical phenomena. Clocks hanging next to each other match each other's rhythms as a result of transmitting sound pulses. In general, it was noted that synchronisation occurs by exchanging signals within a certain closed object. The aim of interpersonal synergy is therefore integrative matching and **synchronisation through imitation and unification**, including complementary activity, which leads to functional unification (Fusaroli et al., 2013). Synchronisation was included in the group of factors characterising synergy.

3. Limits of synergy

Because man cannot cross existing biological barriers, he must self-organise their energy capabilities, thanks to which he achieves energy stabilisation. Crossing the limits of energy stabilisation means pathological behaviour on the part of the brain and man. Chaos is one of the causes of the breakup of self-organisation and means the breakdown of synergy. The point at which the disintegration takes place is the bifurcation point. Dynamic systems become increasingly unstable as they move away from equilibrium, then a new system can be created, and if the disorder is significant, disintegration follows the bifurcation point.

We assume that in the case of man, besides the bifurcation limit, there is also chaos and the ineffective loss of energy, and this type of excess ends with pathologies. Up to the bifurcation limit, all energy processes, especially in the human brain and the entire organism, occur correctly; there is an energy balance, an equilibrium of chemical reactions, and self-organisation. Outside the bifurcation limit, all biological, chemical and psychological processes are subject to disturbances, and thermodynamic changes occur. An operation of a different type becomes necessary, so that the body continues to function properly and at the same time uses energy in a rational way. Points distant from the equilibrium system are increasingly unstable as they move away. Such processes take place in many fields of science, and the precursor of such a course of thought in the mathematical formula of bifurcation was M.J. Feigenbaum (King-Smith, 2014). Inside the system, people move better on roads already "worked through", hence the repeatability of activities strengthens the system (Couzin, Krause, 2003). On the other hand, deviations involve additional energy expenditure, which causes difficulties, and these can lead to the achievement of bifurcation limits and the disintegration of the system.

3.1 The brain as a subsystem element

H. Haken recognises the brain as one coherent, coordinated system. The brain consists of 100 billion neurons (10^{11}) and it is possible for 10^4 connections to exist in an individual neuron. In this context, each neuron is a separate system. The problem is, however, to create mathematical equations that mimic biological processes and translate them into physical processes. One neuron performs millions of operations, so it is difficult to say whether a neuron is one of the elements of the system (subsystem) or a separate independent system. However, it is subject to the laws of physics (Haken, 1996).

There is also agreement about the fact that the brain is understood as a self-organising unit, operating in a coordinated manner. Neurons also tend to **self-organise, stabilise and be flexible**. Neural networks are subject to phase transitions. This also applies to synchronisation between behaviours and the brain perceived as the entire system. Studies have revealed time dependencies between particular areas of the brain, which may suggest that the brain is a coherent unit. According to this concept, **the brain is a self-organising system** which operates in an unstable environment that can flexibly switch from one state to another (Kelso et al., 1992).

The brain demands constant activity. As early as 1908, Robert Yerkes and John Dodson determined that human efficiency is low at low stress levels, while it reaches its maximum at elevated stress levels. The breakdown of activity takes place under the influence of very strong stress. Effectiveness behaves like an inverted U in relation to arousal (Yerkes, Dodson, 1908).

Because the brain constantly demands glucose, which it cannot store, and the cost of brain operation at rest is 20-25% of total human energy consumption, the body constantly provides it, ensuring homeostasis of the body. The brain, however, strives to **minimise the energy consumed**. Therefore, the effort put into thinking or other activity that consumes resources is associated with slight discomfort (Rock, 2017). Providing a certain **minimum energy** can result from genetic conditions. As a result of evolution, man developed “activity genes”, the level of expression of which is regulated by physical activity (Chakravarthy, 2004). As a result of evolution, the perception/action dependence in the brain developed as a permanent link between the human body and the environment. The prefrontal cortex has become the main tool in the process of behaviour, language and reasoning, as well as maintaining balance with the environment. Interestingly, the brains of animals, including reptiles, fish and mammals, are built according to the same model as the human brain: for example, the pallium of the brain is common in the natural world. Self-

organisation of the brain results from the existence of the cerebral cortex (Fuster, 2013). The archicortex, also found in lower vertebrates, is responsible for emotions and motivations. The neocortex, which exists only in mammals, transforms sensory impressions, plans and is responsible for cognitive processes - memory, thinking, and language functions. The whole nervous system is a homeostatic unity and results from the aspiration of all systems for self-organisation. **Therefore, the system cannot grow uncontrollably**. In the organic world, the rule of self-organisation and self-regulation prevails, in which a certain level of the established state is achieved, there is a certain constant energy consumption, and the increase and loss of mass is balanced (Kirschner et al., 2000).

In order to act constantly, the neural system requires energy. The flow of ionic current through the neurons recruited to a given process consumes most energy. **The system tries to minimise its consumption**. Ion pumps consume almost half of the brain energy required (Ames et al., 1993). Another interesting issue is energy recovery in the resting state of the brain. This type of process is analogous to the concept of resting energy in physics. The theory regarding resting energy indicates that the mass of an object or system, such as the human brain for example, is a measure of the energy contained in it. Resting energy remains non-zero. The non-zero resting energy of the isolated system and its equality with resting mass is an important scientific discovery.

The brain at rest requires energy. Neurons represent 10% of all brain cells and consume 80% of the total amount of glucose and oxygen delivered. In addition, neuronal cells do not have the ability to store high energy components. In-vitro studies indicate that the majority of energy produced by 60-70% neurons is spent on maintaining and restoring appropriate potentials on membranes after functional depolarisation (Jankowska et al.,2014).

The brain, using limited resources, also uses energy in different ways in the case of emotions, thinking and self-regulation. Each of these processes lasts a different amount of time and consumes different amounts of energy. Below 200 ms, emotions are triggered automatically and unconsciously using the reward and threat system. They are a short sensory mark which quickly affects the innervation of the body and neurotransmitters. They can be seen analysing the facial expressions expressed through sadness, anger, and joy. At longer intervals, thinking occurs (about 250 ms per second), which already includes connections from the cortex and regions of the brain that support the emergence of consciousness. Thinking allows you to concentrate on any task and is only then transferred to long-term memory, and includes slower-acting substances

in the brain - hormones and neuropeptins, e.g. oxytocin. Another process is **self-regulation, requiring the most energy** and lasting the longest, the function of which is to minimise danger (costs) and maximise reward, which affects well-being. It is in excess of one second. It is the ability to build social relations as well as modulating activities based on changing external stimuli (Gordon et al., 2008).

3.2. A company as a synergistic brain system

The small enterprise system has several important features. Considering the quality criteria, we have financial independence and separation from the general financial sphere of the economic system. The owner of a family enterprise tries to shape relations between employees in the form of a partnership. Especially in the initial phase, he/she tries to use his/her own financial resources and profit earned. He/she manages material resources such as cash and company funds, but also fixed assets, means of transport, raw materials, materials, etc. Among intangible assets there are all kinds of company values such as knowledge, the skills of staff members, traditions, and the company's brand (Klimek, 2009), but also an undescribed energy resource for individual members of the company's team. It also indicates trust, close relationships, aversion to risk and lack of readiness to make changes. Honesty is one of the most important values indicated by this type of entrepreneur (Turek, 2015). For many years it has been one of the important features of this type of economic entity.

The company exists because it has lower marginal costs for coordination processes than on the open market. Therefore, it pays to move the business to the company instead of operating on the market in complete dissipation and increasing marginal costs (Sobiecki, 2011).

As we have already mentioned, one of the intangible assets of a small family business is the life energy of its members and the protection of this resource. It can also be assumed that the members of the system strive to act in a stable manner, subconsciously protecting the current state, because it requires them to consume a smaller portion of energy than if they undertook unusual activities. This depends, of course, on the personality of individuals and their motivation.

The company may be a manifestation of a **system of functioning brains** affected by external and internal phenomena of a biological and thermodynamic nature. In this system, maintaining the health of individual team members can be one of the most important elements in shaping the business. Since no such studies have been conducted so far, we can rely on certain analogies that suggest the existence of such a state.

In 1913, a synergy analysis was carried out. M. Ringelmann showed that in the case of a growing group, individual team members became progressively less productive. The effect illustrated the inverse relationship between the size of the group and the effectiveness of individual group members in the implementation of a task. In fact, it turned out that members of the group committed less effort together than separately. This experiment showed that action in the group does not increase the effort of individual people; on the contrary, the phenomenon of loss of motivation was observed (Ringelmann, 1913).

The issue of social idleness was also analysed in other aspects. The involvement of people shouting together and separately was examined. It turned out that as a result of group shouting, the performance measured in decibels of individuals dropped in relation to the effort put in alone. In pairs, the efficiency dropped to 59% of the individual potential, and in six-person groups to 31% of the individual potential (Williams et al., 1981).

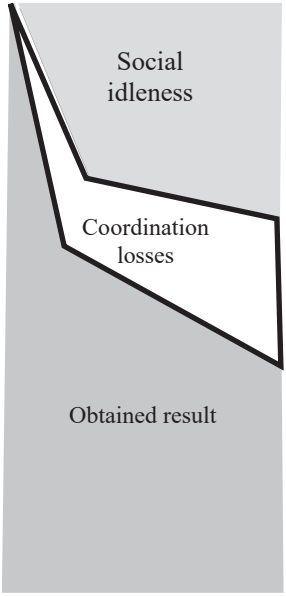

Fig. 9-2. Social idleness
Source: Williams K., Harkins S., Latane B., Identifiability as a Deterrent to Social Loafing: Two Cheering Experiments, Journal of Personality and Social Psychology, 1981, Vol. 40, No. 2, 30

This type of analysis is also confirmed by a simple test, using a hook scale (fishing/suitcase scale) with a digital display giving the load capacity in kilograms, weighing up to 50 kg, with an accuracy of 10 g. The scale has a practical plastic handle to hold the whole weight, and a metal hook on which a suitcase or another weight is hung.

The test conducted consists of a separate measurement of the pressure of the left thumb of the subject on a metal hook; however, it was necessary to apply pressure with maximum force on the metal hook with the thumb in the area of the finger on the bend between the phalanges. The test was done by the subjects individually and then together with another person, as a pair. Pressure was applied on the metal hook with the left hand, carefully with the thumb and holding the ergonomically profiled part of the scale - with the right hand, with all the fingers. The test was of a pilot nature and it took place on 8 September 2018. The subjects were not informed of the purpose of the study. They were asked to apply appropriate pressure with the left thumb on the metal hook of the scales. The subjects were instructed on how to press on the metal hook, with which hand to hold the plastic, ergonomic handle of the scale, and what direction to press on the metal hook. Because the metal hook is semi-circular, it creates certain difficulties when pressed jointly, because the two left thumbs of the subjects do not fit on the semi-circular surface. Each time the subjects have to agree on a manner of applying pressure, which was considered a method of mutual coordination. First, the subjects were asked to individually press their thumb on the hook of the scale, after which they were informed of the need to jointly press the hook of the scale.

Test 1. Conducted in a sitting position by couple A.
Woman - independent pressure with the left thumb 4.1 kg
Man - independent pressure with the left thumb 7.6 kg
Joint pressure by the woman and the man = 8.4 kg
Test 2. Conducted in a standing position by couple B.
Woman - independent pressure with the left thumb 9.31 kg
Man - independent pressure with the left thumb 18.2 kg
Joint pressure by the woman and the man = 21.15 kg

Fig. 9-3. Suitcase scale

The result confirms the Ringelmann effect: joint pressure on the metal hook was smaller in the case of two people pressing together than with each person pressing separately. The result was identical for test A and B.

The effect of social idleness can therefore be one of the proofs of protection of a certain constant level of effort within a larger group. We do not make an effort because we protect our existing energy resources. We do not want to expend the energy of the brain to perform tasks. We prefer other members of the team to make an effort. Within the system it is possible to achieve the goals set, **in a given group there is no reason to exceed the constant energy level** of the group.

Another analogy hypothesising that a company is a stable and scalable system that protects its resources, including energy, is found in studies on the statistics of companies. In Poland, 96.2% of companies are micro-companies employing up to nine employees. Interestingly, there is an average of **4.8 people** in an average company in Poland, and such an economic entity employs an average of 3.4 people (2016) (Skowrońska, Tarnawa, 2018). It seems that this type of organisational unit is most effective in the local economic environment and makes the best use of available shared resources. Synergistic activities can achieve the highest

efficiency, and social idleness can have the lowest value. It is also possible to put forward a thesis that such a group is also the best at self-organising, and it expends its life energy to the greatest extent.

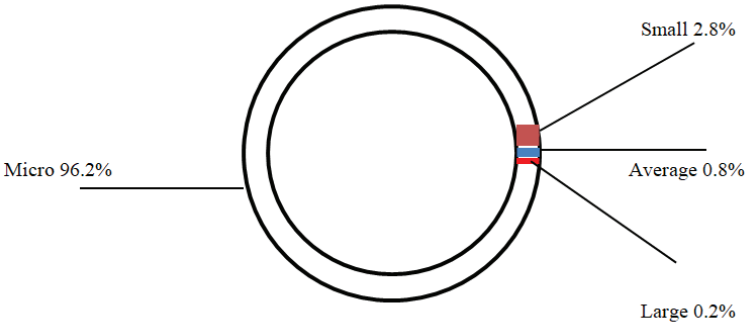

Fig. 9-4. The number of micro, small, medium and large companies in Poland

Today we have only a few ways to measure the common life energy of the company system, although it may be helpful to conduct a survey of individual people operating in the company, and to evaluate the energy used through a survey.

3.3. EEG and brain imaging

The development of new technologies makes it easier to look at the functioning of the company from the perspective of life energy. Since we have to deal with the flow of energy in the brain, we can check the reactions of the system participants to various types of phenomena which take place in a small group. EEG allows us to measure bio-currents in the brains of the subjects.

Chemical energy is already present at the cellular level in every human being. In the resting state, the inside of the brain nerve cells has negative potential in relation to the environment outside the cells. This is due to the pumping out of positive sodium ions (Na +) to neighbouring cells. These ions cannot penetrate back into the cell, which is why it creates the predominance of negative charges. The voltage generated in this way on the cell membrane is around -70mV. The activity of neurons in the brain involves, among others, passing sodium ions in both directions, the simplifying of which causes the formation of an electric field that is

imaged by the EEG. It imitates external currents flowing outside the cellular environment. The activity of individual neurons cannot be seen, because the amplitude of the potentials they generate is too small to receive the electrical impulse of the EEG electrode. Some of the nerve cells, however, are constructed in such a way that no electrical impulses are sent outside to the measuring electrodes (Wróbel, 1997).

Although individual presentations of frequency ranges and amplitudes of brain waves are slightly different, they can be included in the table (tab. 9-1)

Table 9-1. List of ranges and amplitudes of rhythms

Type	Frequency range	Signal amplitude
Delta	0-4 Hz	Variable
Theta	4-8 Hz	50-100 μV
Alpha	8-12 Hz	10-150 μV
Beta	12-29 Hz	<25 μV
Gamma	30-100 Hz	1-10μV

Source: Tonio Felix Heidegger, The role of gamma oscillatory activity in magnetoencephalogram for auditory memory processing, Dissertation zur Erlangung des Doktorgrades der Medizin des Fachbereichs Medizin der Johann Wolfgang Goethe-Universität Frankfurt am Main, Frankfurt am Main 2010.

3.4. Brain in action

The concept of human energy is known from many scientific works. The personal energy pool is associated with satisfaction that leads to the maximum satisfaction of human needs. Motivation is a process that uses energy to ensure the maximum level of needs met (Pritchard, Ashwood, 2008). E. Duffy indicated that an emotion represents a change in energy level, and the energy level is the degree of energy mobilisation of the body (Duffy,1962).

Homeostasis, as described by W.B. Cannon in 1929, defined man as a coherent self-regulating system of the state of a living organism. At the same time, the author referred to the principles of statics, in which the axiom is that “all counteraction of force is counter-directed”. It is one of the basic axioms of statics. Homeostasis derives from homeostatic. The constant number and proportions of individual components that build the human body and cells are indicated. Each distraction in the delivery of ingredients to the cell causes consequences associated with the disruption of the cell and the whole body. There is, therefore, a minimum condition

in the body, and any external disturbance causes interaction. The body, however, always strives for stability (Cannon, 1929). Starting from the concept of homeostasis, G.L. Freeman indicates the sources of energy creation in a human being and the formation of the phenomenon of motivation. Each stimulus triggers reactions and energy. **A human being is an energy system** that generates new energy through activation. The human cell is an energy system, the circulatory system is an energy system and the whole organism is an energy system, as well. Therefore, the system is held entirely in accordance with the principles of physics and the brain is one of its elements. The body is thus an energy system influenced by internal and external stimuli. Each event triggers the operation of the system, while the body tends to return to its previous state (Freeman, 1948). Many similar examples prompted G.L. Freeman to state that the internal factors that build the homeostatic energy balance of the body determine the motivation concerning the external environment. Therefore, every **threat causes an increase in energy**, and then a discharge takes place in order to reduce the load on the nervous system. The energy system keeps the brain centres in a state of vigilance to ensure the satisfaction of basic needs, adapting to the changing environment. In the case of small children, the unloaded energy is manifested when a child runs after a dog or hits an element with a stick. That is why our energy system is blocked by social systems. Some things should be done; others should not. Blocking causes frustration, which is why homeostatic conditions require discharging. The body can react to various obstacles in different ways; it may not accept the inhibitory conditions, which is why it accumulates energy and tries to change reality or tries to minimise metabolic costs. The voltage is subsequently discharged. However, there is a basic energetic state in which the body functions at rest (Freeman, 1948).

K. Lewin introduced the concept of psychic energy and the assumption that the body strives to balance the entire human system (Lewin, 1972).

Although the brain is not a human being, it is the main organ that allows us to function, which is why it can be the main object of research, affected by thermodynamic forces.

One of the ways to scan electrical flows in the brain is by means of EEG devices, thanks to which you can observe the rhythm of brain waves with different frequencies illustrating the flow of bio current in the brain.

For the purposes of the experiment, the NeuroSky MindWave device was used, which works by default with the popular operating system Windows 7. EEG tests were carried out from April to December 2018, thanks to which an insight into the repetitive processes characterising certain energy states in the brain was obtained. The article is limited to the

analysis of gamma waves (rhythms) and delta waves in one case. As far as gamma waves are concerned, their role is not sufficiently known at this point in time. It is possible that the wave rhythm provides information that the communication between dispersed neurons triggers the gamma rhythm. It binds the functions of the brain involved in the observation of the object. This rhythm testifies to physical activity and motor functions as well as cognitive processes such as perception, memorising, and recalling memory. Also, paying attention to an object causes an increase in gamma waves (Hulewicz, Jukiewicz, 2014). It is also suspected that the rhythm is associated with mental activity, the perception of stimuli and consciousness. They appear in stressful situations, during stage fright, in anxiety and in emergency situations (Broniec et al., 2009). There is evidence that this rhythm also correlates with memory and attention. While studying gamma waves, it has also been discovered that characteristic signals appear not only in the case of a stimulus, but also when a patient thinks about a particular activity before it occurs (Rak et al., 2016).

4. Imaging of activities

One example of the effects of gamma waves is the moment of falling asleep. In the figure below (Fig. 4), the moment of falling asleep is illustrated by lowering the gamma wave level; the average amplitude of gamma waves is also clearly reduced. After waking up, we obtain the state of gamma waves at a lower level than in the period preceding this fact. This type of wave image may indicate that the state desired by the brain is to achieve a lower level of gamma waves. This state is a form of comfort for the brain. In the case of a small company, its participants will also strive for a relatively low level of gamma waves, because it is comfortable for the company's participants. Peace can be one of the elements which strengthens the internal system in the company.

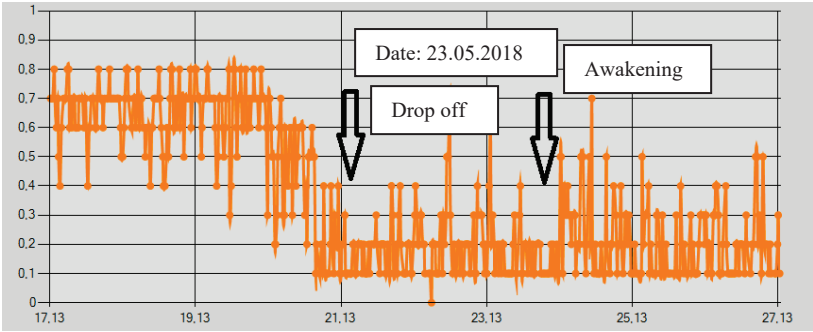

Fig. 9-5. Accidental falling asleep

The difference between gamma wave levels is also visible in the case of the evening scan (Fig. 9-6), when gamma waves are in a state of high arousal and at higher levels than relatively early in the morning (Fig. 9-6). The evening scan is characterised by the fatigue of the subjects, which is why gamma waves are at a relatively high level in the image. Their frequency is slightly lower than in the morning. In the morning scan, when the body is rested, gamma waves oscillate at fairly low levels, although their intensity is higher than in the evening. This type of imaging was repetitive.

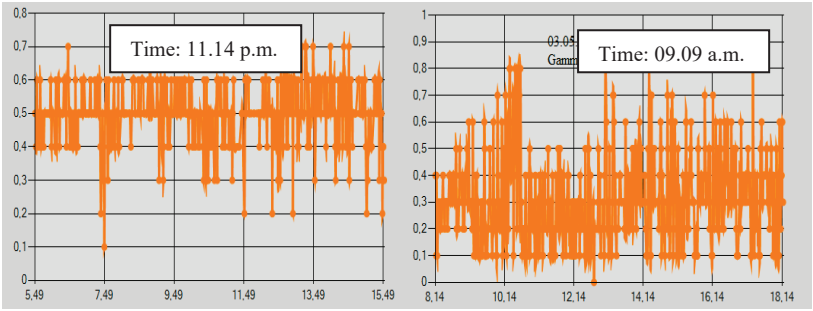

Fig. 9-6. Morning and evening EEG images, Gamma 2.

We also come across the reaction of the reduction of the gamma wave level when the subject expends physical effort. The moment of physical exercise reduces the level of gamma waves, also reducing the amplitude of individual waves. This type of reaction may explain why we sometimes

like physical exercise, thanks to which our brain obtains a lower level of use of bio-currents.

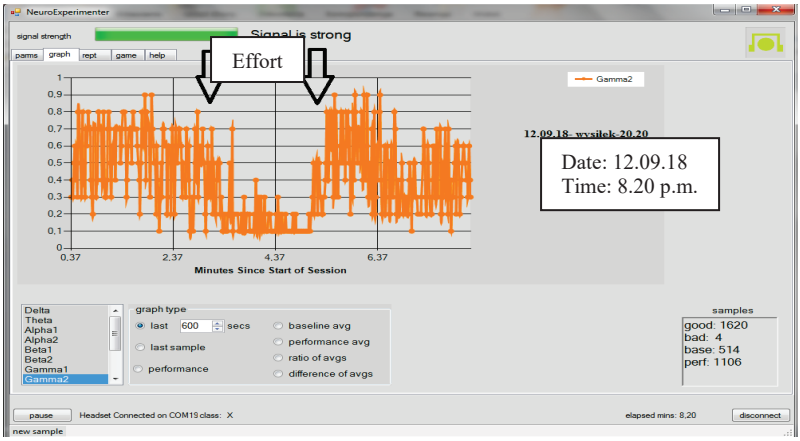

Fig. 9-7. Physical effort- Gamma 2.

A similar image occurs in the case of joint effort, during which both people perform joint strength tests. Each time, gamma waves are reduced to a lower level.

Fig. 9-8. Joint effort

Similar observations in gamma waves are visible in the case of a friendly embrace of people working in a family business. We also observe a decrease in the level of gamma waves, including a lowering of their amplitude, but also a lowering of the amplitude of delta waves.

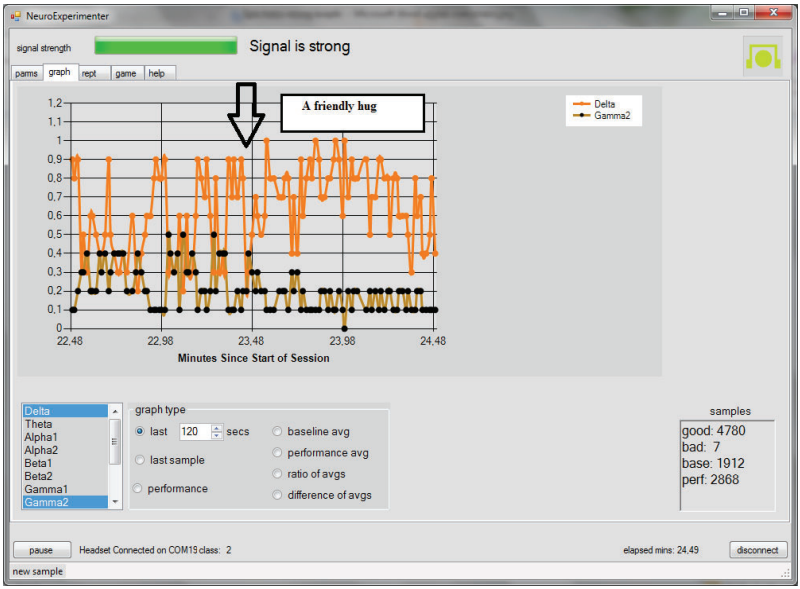

Fig. 9-9. A friendly family embrace

Experiments with EEG measurements may indicate that the brain is a system that is subject to self-regulation. The brain is an interesting object that can affect the external environment (Friston, 2010), and this allows it to survive in the long term. Therefore, a stable family company team is an environment in which it is possible to maintain peace and thus save energy. Because the brain is a dissipative system, it aims to minimise the energy expended in a specific environment (Friston et al., 2006). At the same time, information is better absorbed in a state of relaxation, which is important for strengthening the system's coherence. Repeatability is also an element of stabilisation. A family or stable team of employees allows you to minimise the energy you spend as part of specific tasks. A friendly family embrace proves that there is a relationship between minimising energy and friendly family behaviour. Positive behaviour and a good atmosphere influence energy reduction. In such an environment, it is

possible to maintain the company's internal system, stabilising it over the years of operation.

The functioning of a small family business is an interesting research subject, assuming that it is a system shaped by the laws of thermodynamics. As part of the system, synergic processes take place which increase the durability of a given system. Continuous information flow within the group strengthens it, while the closeness of the surroundings, internal peace, and thus the ethical behaviour of team members reduces the intensity of brainwave flows, minimising the energy used. The brain always tries to minimise the use of its own energy potential, which is why cooperation decreases the intensity level of brain wave flows. The smaller the group, the smaller the need for coordination and the smaller the amount of energy consumed. Self-organisation together with synergy maintains the system. Outside the bifurcation limit, the existing system breaks down. The laws of thermodynamics affect the functioning of the system, including small family businesses. In this approach, synergy includes limited resources which, as a result of coordination, are maintained in a thermodynamic order. Synergy and thermodynamics allow small family businesses to be self-organising, to save energy for individual group members.

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CHAPTER 10

FACTORS, MECHANISMS AND ACTIONS SUPPORTING THE RESTRUCTURING PROCESS

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TOMASZ GRZEGORZYCA[2]

Summary: In the case of unfavourable changes taking place inside the company or in the external environment, adaptation and restructuring activities play a key role in limiting or completely eliminating the possible effects of these changes. Well-planned activities and the appropriate manner of their implementation may positively affect the financial condition of the company and ensure its stability. Developmental, corrective and preventive actions may even be elements of building a competitive advantage through rational and adequate reactions to specific changes. The aim of this article is to indicate and to extract determinants, mechanisms and actions supporting the restructuring process. The following hypothesis was adopted: adequately carried out restructuring measures ensure the stability of a company and maintain its market position. It was also assumed that both remedial and developmental actions can build a competitive advantage.

Key words: restructuring process, restructuring, change management.

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1. The concept and the essence of the restructuring process

In both Western and Polish literature, many definitions of restructuring may be found. R. Borowiecki describes restructuring as modernisation, systemic reconstruction or the modernisation of the organisational structure as well as the principles of the functioning of companies. This process has a complex, multidimensional and long-lasting nature. The decision to undertake restructuring is a critical situation in the development of enterprise structures (Borowiecki, 2003, 77).

Another definition of restructuring is presented by M. Bitkowska, according to whom restructuring is every change that significantly affects the structure of the company's resources, such as organisation, production, finances, human resources, investments, etc., as well as ways of operating the company that directly or indirectly affect its efficiency and development opportunities (Zakrzewska–Bielawska, 2003, 171).

According to the definition presented by Z. Sapijaszka, "restructuring is a radical change in at least one of the three dimensions of the organisation, i.e. the scope of activity, capital structure or internal organisation of the company. The purpose of this change is to restore the company's internal balance and balance with the environment" (Sapijaszka, 1996, 30).

In addition to the definition of restructuring, it is also necessary to explain what the restructuring process is. According to C. Suszyński, the restructuring process "is a complex process of significant, often fundamental changes in the enterprise, whose objective is the current (operational) and long-term (strategic) shaping of attributes of its subjectivity in terms of changes in the environment and internal needs of the enterprise" (Suszyński, 2003, 71).

2. Reasons for and objectives of restructuring

D. Lovett and S. Slatter list 13 reasons that affect the deterioration of the company's situation, which in turn leads to deep remedial actions, i.e. company restructuring.

1. Poor management resulting from the lack of competences of management staff.
2. Incorrect financial control - management is not able to determine which products bring in the most profits, which absorb the most cash and which customers the company loses the most money on,

3. High costs - enterprises whose costs are significantly higher compared to their main competitors have far fewer possibilities to strengthen or defend their position on the market.
4. Insufficient marketing activities that can directly contribute to the decline in sales and profits. This phenomenon, however, most often occurs along with other strategic problems.
5. Poor management of working capital, i.e. management of cash, receivables, inventories and liabilities. Reducing debt while increasing receivables and inventory means freezing cash, and this can lead the company into a deep crisis,
6. Activities not adjusted to financial possibilities, i.e. overtrading, which is characterised by an increase in sales on an excessive scale, which is unsuitable for the company's financial capabilities, which come from internally generated cash flows and loans taken out. The reason for overtrading may be inadequate (or a complete lack of) financial control in the company.
7. Changes in commodity prices, i.e. changes in the costs of product purchases, exchange rates, real estate prices, interest rates, etc. There is no control over the company's management of these items. Their prices may also change in a relatively short time and over a wide range.
8. Acquisitions - may prove problematic for the acquirer if they concern the acquisition of a poorly managed, financially inefficient company with a weak competitive position on its own market.
9. Organisational mess and inertia - problems with making and implementing decisions that may be caused by improper organisational structures in the company, low staff motivation, lack of clearly defined responsibilities, and poor leadership resulting from improper or absent management procedures.
10. Changes in market demand caused by a drop in demand for a given service or product, or changes in the forces that shape this demand.
11. Competition - both product and price. The lack of a response to the changing market needs, or a late response thereto, may lead to a company going out of business.
12. Large enterprises - all undertakings, of an exceptional nature and scale of operations, except for acquisitions. Due to errors in the preliminary estimates (overly optimistic forecasts regarding the level of revenues, or low costs), such projects may cause the company to collapse.
13. Financial policy - may be the reason for the company's collapse as a result of: high leverage ratio (debt / equity), financial policy in a

> conservative way, which is manifested in not taking into account the needs of reinvesting in facilities and equipment, high dividend payment ratio, low leverage ratio, though high liquidity, and in a situation when the company inefficiently combines the funds borrowed and invested (Zakrzewska–Bielawska, *Przyczyny*…, 2003, 439-440).

According to H. Jagoda, the reasons behind restructuring processes can be divided into external reasons related to the environment of the enterprise, which are independent of it, as well as internal ones that are the result of processes which take place inside the company. As internal reasons for restructuring, we should mention: excessive expansion and overly intense diversification, bad financial results of the company, errors in planning, and a lack of control over the company by managers.

Through excessively intense diversification and expansion, the company may struggle with poor financial results, an inability to perform its operations and a generally disadvantageous situation. Such reasons should be a stimulus for management, or guidelines that may suggest the need for restructuring. The awareness of the need to carry out remedial processes is a key condition for starting to do so. The company's fatal financial results, which are a symptom of its crisis, may however result from various causes. Nevertheless, they should be a stimulus for an analysis of the position of the company, which may require the implementation of restructuring processes. It may turn out that the awareness of the necessity of making significant changes comes so late that the enterprise has to choose between restructuring and liquidation, which may be the only solution in the case of a deep crisis (Garstka, 2006, 20-21).

External causes of restructuring include:

- the global financial crisis,
- changes in the tax system,
- technological changes,
- changes in legal regulations,
- growing competition.

Often, it is sufficient to adapt the company to these changes in order to unify the impact of small changes taking place in the environment. If the above-mentioned reasons occur to a large extent and adaptation measures are insufficient, restructuring may be necessary. Negative shaping of financial and non-financial measures as well as the will to develop and increase the value of an enterprise may also be the cause of restructuring. It can therefore be concluded that restructuring can be developmental or anti-crisis. It is also worth pointing out other reasons for restructuring, such as:

- changes taking place in the national and international economy,
- changes and transformations in the areas of company activity,
- decline, lack of progress and economic stagnation of the enterprise,
- the further functioning or even existence of the company is at risk,
- anticipating changes that may occur in the company's environment.

Another extremely important reason for restructuring can be a crisis that the company is struggling with. Companies find themselves in such situations for various reasons. Therefore, depending on the specifics, various anti-crisis measures are taken, which are presented in Table 10-1 (Garstka, 2006, 20-21).

Table 10-1. Anti-crisis projects.

Causes of the crisis	Adaptation to the reactive environment	Adaptation to the proactive environment
Related to business management	• Change of management staff, • Cost reduction, • Employment reduction, • Financial restructuring, • Sale of property, • Restriction of administration	• Investing in new products or market segments, • Strategic alliances, mergers, • Takeovers of another company, • Investing in people, • Introducing new management concepts.
	CLEAN-UP	**INVESTING**
	WITHDRAWAL	**CONSOLIDATION**
Related to the range and the type of business	• Sale of plants, • Resignation from certain activities, Withdrawal from some markets, • Limitation of the product portfolio, Decision not to invest.	• Redefining activities, • The definition of core business, • Concentration on selected markets, • Introduction of a cost strategy, • Exposing quality problems, • Exhibiting human resources, • Diversification for survival

Source: Wawrzyniak B: Renewing an enterprise. For the 21st century meeting. Warsaw 1999, p. 270.

Regarding the objectives of restructuring, S. Podczarski cites the basic one, an extremely important goal of the broadly understood restructuring in industrial enterprises: namely to improve the economic efficiency of business management. In general, we can divide the objectives of restructuring processes into three main groups. The first of these are economic goals, which include: more effective management of the enterprise, skilful use of the company's resources, reduction of inputs (capital, raw materials, energy, materials) for the production process and its modernisation, strengthening of the competitive position on the domestic and foreign market, and an improvement in export efficiency.

Social goals are the second group of goals for restructuring. These goals are nothing more than improving working conditions, improving employees' salaries, motivating staff to improve their professional qualifications, skills and knowledge, and rational use of leisure time.

The last group is the ecological goals of restructuring, which include the renewal of the biological environment, reducing emissions of harmful substances to the environment, caring for the well-being of people and other living beings, reducing the level of pollution of areas and the amount of industrial waste. All these activities are components by which to restore the natural balance (Podczarski, 2016, 23-24).

According to A. Bitkowska, "the primary goal of restructuring is to introduce changes in the company that will increase (or restore) its ability to generate profit to a level that guarantees further development from the long-term perspective, and from the short-term perspective, to achieve the required positive difference between operating costs and those achieved with its income" (Pacholski, 2009, 6).

For long-term purposes, we can also include gaining a competitive advantage in terms of selected elements of the company's operation and investors showing interest in further development of the company by increasing its market value (Pacholski, 2009, 6).

There are changes that should necessarily be included in any restructuring programme. Such changes include, among others:

- constantly growing consumer expectations in terms of product quality, reliability, and timeliness of services and deliveries, which requires constant modernisation of production, the implementation of quality control systems and production control (the customer forces change upon enterprises, making them adapt to it, not retreat),

- implementation of new products - increasingly frequent attempts by enterprises to innovate, which become continuous processes, not one-time acts.
- a clear advantage of supply over demand in many markets, in the case of high-quality products that are based on the latest technologies,
- growing tendencies for the comprehensive use of information technology, robotics and the automation of production processes,
- searching for savings due to the limited amount of natural resources, implementation of less energy-consuming and material-intensive products, which leads to changes in the structure of economic costs in companies,
- the principle of "think globally, act locally", that is, strategic management on a large scale and the increase in the importance of marketing,
- focus on the rapid acquisition and processing of information, which has become an extremely valuable resource for many companies,
- creative marketing activities and a modern approach to their application,
- applying different target market strategies for their products, in the face of increasing competition,
- legal reforms,
- constant changes in the approach of governments to the problems of restructuring in the country, which requires constant monitoring by entrepreneurs,
- reform in the sphere of requirements of work organisation and employee ambitions - these are usually interpreted as a pathway to self-fulfilment. Some entrepreneurs use the changes on the employer's market thoughtlessly, which may cause adverse fluctuations of personnel (Dorozik, 2006, 11).

Enterprises must constantly face confrontation with their competitors while trying to equate stability with changes. Any changes should be made in advance before the competition has anticipated them. Companies that can improve their quality, and implement innovations while maintaining flexibility, will achieve success (Bitkowska, 2010, 46-47).

3. Types of restructuring

Restorative restructuring, also called rescue restructuring, is implemented in the earliest stages of transformation (Bitkowska, 2010, 47-49).

It is most often introduced as a response to the poor situation of the company and the constantly deepening crisis (Suszyński, 2003, 124).

This type of restructuring strives to stabilise the company's financial situation while preventing bankruptcy.

It is also related to the suspension of investments, delay in repayment of receivables, liquidation of individual cells and their separation, and then becoming independent (Brzeziński, 2007, 131). The characteristics of restorative restructuring are presented in Table 10-2.

Table 10-2. Rescue restructuring of the enterprise - definition and characteristics.

Restructuring	
Definition	**Characteristics**
Rescue restructuring prevents the liquidation of the enterprise, improving financial liquidity by reversing economic trends which are unfavourable for the company. It focuses on short-term activities, the effects of which will be noticeable relatively quickly, due to the improvement of the financial efficiency of the organisation.	• Limitations in production, • Improving the quality of products, • Limiting or liquidating ineffective cells, • Improvements in management, • Exemptions for employees to reduce costs, • Sale of property, • Sale of part of the property.

Source: own study, based on Bitkowska A.: Restructuring processes a condition ..., op. cit.

The implementation of the restructuring process allows the company to survive in the near future. Nevertheless, it is very difficult to carry out this type of restructuring, due to the degree of significance - the condition of the company's survival is a well-executed restructuring activity. It is therefore important to carry it out in many areas - economic, human resources, technical and organisational. The condition for the further, proper functioning of the company is to make changes at the right time, in an appropriate manner. Otherwise, the company's continued operation may be at risk (Osbert-Pociecha, 1998, 79).

For many enterprises, restorative restructuring may be a necessity. It can be the only salvation from bankruptcy. This type of restructuring can be carried out in two ways: with the involvement of all the material and human potential that the company has, or by reducing the part of the

potential that cannot be used in an efficient manner due to the situation in the environment of the given enterprise. It also applies to enterprises in which there is no direct bankruptcy, but which are at risk. In such cases, changes are often imposed by creditors and are introduced too late, as a result of which their implementation takes place under inappropriate conditions and with a lack of financial resources. In this case, the company faces many limitations and obstacles - it is not able to take advantage of opportunities emerging on the market, is vulnerable to any threats and loses competitive advantages (Brzeziński, 2007, 131).

Developmental restructuring is carried out based on the strategic decisions of the company and usually lasts between two and five years. This type of restructuring focuses on structural and quality changes on a large scale, innovation in the scope of production, technology and marketing activities, undertaking risky ventures, and solving problems in an anticipatory manner (Sapijaszka, 1996, 17).

Developmental restructuring (also known as progressive restructuring) focuses on strengthening the position of the enterprise on the domestic market and expanding into foreign markets as well as increasing the competence of the staff, decentralisation in the scope of decision-making powers, and the flattening of organisational structures (Brzeziński, 2007, 132).

Table 10-3. Developmental restructuring of the enterprise - definition and characteristics.

Developmental restructuring	
Definition	**Characteristics**
Developmental restructuring focuses on long-term activities, based on the strategic decisions of the company; it focuses on technological, economic and marketing innovations, and does not preclude taking risks	• Broadly understood development activities, • Technical progress, • Technological progress, • Organisational progress, • Establishing new business contacts, Opening up new markets, • Starting new ventures, • Reorientation of production processes.

Source: Own study, based on Brzezinski. M.: Introduction to science ..., op. cit.

"Operational restructuring includes changes in the core business of the enterprise, determined by operating profit or loss, and is reflected in

changes in the status and structure of the company's assets" (Suszyński, 2003, 128).

It has the widest scope of all restructuring. The implementation of operational restructuring should focus on two important aspects. The first is to restore the company's liquidity.

This can be achieved through divestment in the area of unnecessary assets - including financial resources related to social and ancillary activities, such as reducing inventory by improving management. Financing with the company's own assets is very important at the first stage of restructuring because it is very difficult to obtain money from the market. Nevertheless, it should be remembered that the cash flows obtained through the sale of the company's assets are short-term. They are designated for activities which help to maintain an uninterrupted ability to obtain financial resources from the main operating activity. Selling assets does not make sense if it does not serve long-term activities leading to the profitability of the entire organisation. Another aspect is the company's profitability, which will allow for internal financing of the business, without reducing the already limited assets of the company. In order to control activities that affect the profitability of an enterprise, it is worth preparing a profit and loss account. The most important activity which allows the company to overcome a crisis is generating positive gross profit on sales, and thus reaching a margin through the sale of products (Medyński, 2018, prawo-egospodarka.pl). **Organisational restructuring** consists of improving the efficiency of the business management department by implementing changes in the organisational structure. This type of restructuring is very broadly understood, as it is based on activities ranging from reduction of employment, through changes in the organisational system, to modifications in the field of organisational culture. Organisational restructuring is implemented mainly in the case of a decline in performance and the inability to improve results, due to:

- the strengthened position of the competition,
- a reduction of market share,
- archaic technologies,
- an increase in labour costs.

In the case of the above-mentioned factors that negatively affect the effectiveness of the company's operations, in many cases the restructuring process leads to a reduction in employment, which quite often goes hand-in-hand with other changes in the organisation of the company. In addition, organisational restructuring can cause many problems because it

causes disorganisation in the company, which can lead to many unfavourable phenomena, such as the loss of competence of the staff due to the departure from routine activities. In spite of numerous inconveniences and the risk of dispute that entails the implementation of organisational restructuring, it is an absolute necessity in many cases, because it is here that the effects of changes in other areas of the company's functioning accumulate (Sapijaszka, 1996,69-70).

Macro-restructuring affects the scale of the entire industry and is related to the reorientation processes of the entire industry and economy. It is based on the total transubstantiation of the national economy, which results in a change in the ratio of division and creation of national income. Macro-restructuring focuses on achieving long-term goals and is characterised by:

- the fundamental role of the state,
- assignment of changes in the company structure defined in economic policy, and control of restructuring processes,
- the use of mechanisms of the economic and financial system.

In macro-scale restructuring, the state actively seeks to accelerate the development of regions, sectors, products and the economy by applying various measures. Similarly to organisational restructuring, it is oriented towards the implementation of long-term economic goals (Bitkowska, 2010, 52).

Micro-restructuring leads to an improvement in innovation in all areas of operations and relies on changes in the range of products offered or the company's production profile. It is implemented directly in the organisation. Thanks to this, innovativeness has a positive effect in all areas of the enterprise, and also brings about a realistic image of changes that have taken place in the structure of the company's economy. Macro-restructuring is characterised by:

- adaptation activities of the company and its development, according to the requirements prevailing in a given market,
- adaptation of the company's activities to changes taking place in its environment,
- close connection with macro-restructuring, due to the significant impact of shaping the industrial and economic policy of the state (Bitkowska, 2010, 52).

Meso-restructuring is related to the introduction of processes into the economic reality and the improvement of structures such as holdings, conglomerates, or industrial and capital groups (Bitkowska, 2010, 52).

Subject restructuring is aimed at preparing the company legally, economically and organisationally for new system conditions in order to increase the efficiency of operations. Subject restructuring aims to create flexible structures that aim to manage logistics, controlling and marketing cells, as well as build a strategy that positively influences the company's expansion and growth. As stated above, subjective restructuring is the effect of transformations in the fields of law, economics and organisation, and the change may manifest in transformations of ownership. The factors that affect this type of restructuring can include:

- liquidation or suspension of investments that do not generate income,
- limiting the financing of unprofitable activities, ceasing all activities that are not based on market prices and are irrelevant from a strategic point of view.

Regarding the objectives of subject restructuring, they are mainly:

- improving the effectiveness of the company's operations,
- improvements in the management system, technology and technique,
- striving for marketing and market activation,
- improving finance and economics (Bitkowska, 2010, 53).

Objective restructuring means changes in the areas and methods of the company's operation, which are also related to technical and technological changes. This process seeks:

- to improve hygiene and work safety by taking social and health requirements into account,
- the participation of organisations in programmes involving the employment of a labour surplus in relevant fields,
- a quantitative increase in production,
- to generate demand for given products,
- to predict demand and adjust the production range to it,
- to maintain or achieve a high position in the production of specific products on a specific scale (foreign or domestic),
- to improve the profitability of the company while maintaining its predisposition to development,

- to implement technologies that are considered to be environmentally friendly.

By implementing objective restructuring, the company aims to achieve competitiveness, increase the level of technical production and product innovation, reduce energy as material consumption in production processes and adapt to all legal and technical provisions. Differences in the cases of subjective and objective restructuring are very difficult to notice. In many cases, enterprises use restructuring programmes which contain a package of concrete actions in the scope of both forms of restructuring, which differ in their dynamics, character and the way they are financed and stimulated (Bitkowska, 2010, 54).

4. Mechanisms and activities supporting the restructuring process

As is known, there are numerous types of restructuring measures, which are most often caused by a deep internal crisis of the organisation, or external changes (in the company's environment). There are also a number of well-organised and well-thought-out restructuring projects, including: spin-off, or the separation of business units and organisation segmentation; re-engineering (reorientation of organisational processes); lean management, i.e. the concept of slimming a company (production and management system); outsourcing (external cooperation), TQM - Total Quality Management; or comprehensive quality management. In literature, however, many authors treat the aforementioned undertakings as separate and compare them with restructuring (Garstka, 2006, 42).

Spin-off: there are many phenomena that can occur in an enterprise's environment to force them to improve their organisation by, for example, simplifying its internal structure, disintegration, or so-called unbuttoning and getting rid of ineffective structural elements. To achieve this, the separation of individual organisational units from the entire organisational structure of the company is applied, and on that basis, businesses with various levels of independence are formed. The above actions are nothing more than a "spin-off" phenomenon, consisting of "unbuttoning": separating organisational units in the company's structure, and then creating individual, internal entrepreneurs. These are mainly employees of the company who perform their work in a given, separate unit. Spin-off also includes the creation of separate, external organisational units that are directly or indirectly linked to the parent organisation. This approach is used in the reconstruction of the structures of large enterprises, whose

organisational form is very extensive. First of all, the company's areas of activity are separated, which are not directly related to its elementary activity. The spin-off approach is most often implemented when:

- the enterprise is huge, albeit managed in an inefficient way,
- company management strives to remove organisational units that are not related to the company's core business,
- as a result of bottom-up trends, some individuals become independent,
- various difficulties are bypassed as a result of monopoly laws, the tax system, etc.,
- the company aims to normalise management processes by introducing holding and divisional structures (Nalepka, 1998, 125-126).

As for the goals of the spin-off process, also known as disintegration and unbuttoning of the enterprise, we can include:

- improving management,
- elimination of costs related to the payment of objects that are not fully used,
- cessation of dismissal of employees resulting from the insufficient burden on the organisational units of the enterprise,
- obtaining external financing at lower costs,
- invoking entrepreneurial employees (Nalepka, 1998, 126).

Re-engineering is based on re-designing the processes which take place in the company. This is related to beginning many activities from scratch, based on the newly introduced principles. This instrument includes development concepts, market orientations, management structures, as well as methods or operating procedures. When introducing re-engineering, the existing state is not repaired; its re-design and implementation is recreated, as a result of which an unambiguous system of implementation of changes is created. A new process is then implemented or based on the current one. There is no question of making partial changes here (Garstka, 2006, 43).

Therefore, the aims of re-engineering are:

- process orientation,
- maximum simplification of processes that take place in the enterprise,
- wide implementation of IT systems,

- reorientation of processes that are of value to the internal and external client,
- rapid change of processes, which results in the creation of new methods of performing the current work,
- the inclusion of personnel in the management of the organisation,
- improvement of employee motivation by creating appropriate motivation systems.

Through re-engineering, the company creates measurable sets of activities (processes) that are designed to produce a product that can be acquired by an internal or external recipient (Bitkowska, 2010, 92).

The process approach to business management is presented in Figure 10-1.

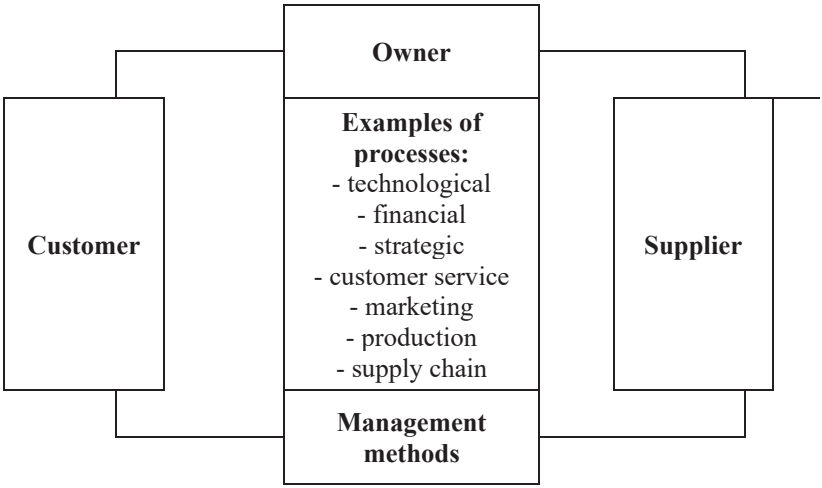

Fig. 10-1. Process approach to organisation management.
Source: own study, based on Bitkowska A.: Restructuring processes a condition ..., op. cit.

TQM, or **Total Quality Management**, means comprehensive quality management. This concept of management consists of the constant improvement of the company's operations by focusing on the processes occurring therein as well as its clients, with the total involvement of the staff. Total means the total involvement of the organisation, each position and cell; Quality refers to meeting the expectations and demands of customers; and Management refers to management focused on problem

solving and constantly striving to improve the quality of work. TQM is a management concept that strives to achieve the highest level of quality (quality of work, product quality), sustainable development, making the most of all enterprise resources, which increases productivity, meets the expectations of its customers and builds a positive atmosphere among employees. Regarding the benefits of the TQM approach, it is certainly worth mentioning:

- effectiveness of the staff, clearly defined priorities and directions of action, transparency of actions undertaken, gaining recognition in the market,
- the positive attitude of the staff to the enterprise, professional development of employees, stability of employment,
- understanding what customers expect, reducing transaction costs, strengthening market position,
- focus on achieving high results, activating the personnel and resources of the company, achieving goals, controlling results and discrepancies, setting realistic goals, taking full responsibility for decisions and manufactured products, greater trust on the part of customers, improvement of credibility, and an increase in the value of the organisation (Bitkowska, 2010, 113-114).

The human factor is therefore of key importance in this concept of management. The skills and knowledge of employees are the key to achieving a competitive advantage. Moreover, teamwork is also extremely important. Total Quality Management clearly indicates that there are no entities in the organisation that have no influence on the quality of this undertaking. Each workplace is therefore important from the point of view of quality (Garstka, 2006, 47).

Benchmarking is a practical way to make changes in an enterprise by comparing it to the best (Suszyński, 2003, 60).

"It should be implemented in a continuous manner, in which products, services and, above all, processes and methods of enterprise functioning are compared. The comparison should be carried out with enterprises which are leaders in the methods and processes studied. These companies are referred to as "Best in Class", i.e. the best in their own class, the industry" (Bitkowska, 2010, 104).

Benchmarking is characterised by:

- a focus on increasing the effectiveness of the company's operations through comparison with the best ones,

- focus on issues related to efficiency, skills development and learning,
- defining patterns of productivity and quality - it sets the path which the organisation should take in order to aim to improve efficiency (Suszyński, 2003, 60).

Benchmarking is an uninterrupted process, used continuously. An enterprise that uses this method has no guarantee that it will bring the expected result. It should be remembered that benchmarking does not always mean comparing the company to the best ones. You can compare your company with another (even from outside the industry) after all, in order to get new ideas and then implement them yourself.

The benefits that a company can derive from benchmarking are:

- reliable business analysis,
- awareness of processes that take place in the company,
- identification of deficits,
- checking the company's strategy,
- strengthening the competitive position,
- questioning the company's goals (Bitkowska, 2010, 105).

Lean Management: lots of companies struggle with being "overweight" and having overly complex organisational structures. In the composition of enterprises, there are often cells that strive only to maintain the function of the internal machine. Moreover, in companies, there is often an excessive level of employment, and the problem of overinvestment arises, which puts fixed costs on the company's products and at the same time worsens their attractiveness and price competitiveness. To overcome the above problems, the concept of lean management was created, i.e. slimming or scaling down the company (Nalepka, 1998, 131). "It means introducing significant changes in the scope of operations, in the structure of assets, organisation and management methods as well as in the field of vocational preparation and shaping of employees' attitudes" (Nalepka, 1998, 133).

Lean management strives to match the company to its real needs. It should be an uninterrupted process that should lead to full use of production capacity, for the sake of timely deliveries and minimum resource consumption. However, it is necessary to plan in terms of materials and production capacity in order to prevent the creation of an excessive amount of resources. When it comes to deliveries, they should be planned in such a way that they do not slow down the entire process. Therefore, they cannot be obtained either too late or too early, because this

disrupts the whole process and it will be necessary to store an excessive number of the received products (Garstka, 2006, 45).

Table 10-4 shows the main differences between traditional management and management based on the lean management concept.

Table 10-4. Differences between traditional management and lean management.

Traditional management	Lean Management
An extensive organisational structure in the company	Tile organisational hierarchy
Targeting on the principle of controlling	Targeting on a support basis
Excessive division of labour, highly specialised workplaces	Merging work, universal positions
Cooperation with many suppliers	Long-term cooperation with a limited number of suppliers
Deliveries require storage	Deliveries in the Just in Time system
Complex technological processes	Transparent technological processes

Source: own study, based on A. Sticker: Outline of the problem ..., op. cit.

We distinguish the five most important and interrelated aims of lean management:

- short production time,
- high level of production integration,
- timely deliveries, based on Just in Time,
- minimum resource consumption,
- maximum use of production capacity (Bitkowska, 2010, 116).

"Outsourcing is a concept of improving the functioning of enterprises, leading primarily to reducing the costs of products or services offered to clients. It involves the use of services, semi-finished goods offered by an external manufacturer-tenderer" (Garstka, 2006, 45).

This concept aims at external service of a given enterprise. It is considered a form of cooperation that is characterised by a permanent bond between the recipient and the supplier, which is based on a constant exchange of information in the field of computerisation, technical and technological development. The external supplier of a given company can

be an entity related to this company or a new company that was created specifically for this purpose. They can also be units that are not in any way related to the company, as well as entities that support the competition. Regardless of who the external supplier of an organisation is, it should outsource deliveries of goods produced outside of its territory, because outsourcing is the separation of ineffective activities carried out in the enterprise. Through the use of outsourcing, the company can focus on its core business, because all processes that are not related to the main business of the company can be outsourced.

In some cases, companies decide to outsource all processes to the maximum possible degree to focus on their core business. Unfortunately, outsourcing does not guarantee the company's success because there are also certain inherent drawbacks. It deprives the enterprise of control over the liquidity of production processes and makes them dependent on the environment. Thanks to outsourcing, the company is able to accurately estimate the amount of these costs, while it is unable to influence them and has limited room to manoeuvre when it comes to reducing these costs for the future.

Usually, such areas of activity are subject to outsourcing:

- distribution,
- training, cleaning,
- machine service,
- consulting,
- protection of property,
- marketing and advertising (Garstka, 2006, 45-46).

5. Factors determining the success of restructuring as well as the opportunities and barriers accompanying this process

5.1. Conditions for the success of the restructuring process

The restructuring process in an enterprise is an extremely complex organisational enterprise. It applies the principles of learning organisation and efficient management. It also contains basic guidelines for efficient operation. Restructuring, however, is in its own way an exceptional activity, of a special nature, because:

- it refers to changes in the organisation on a previously unknown scale,
- it is implemented in an intense way, and the effects are expected relatively quickly,
- it is most often implemented when the enterprise finds itself in a critical situation - a deep crisis,
- the restructured entity usually has no experience in predicting the effects of restructuring activities (Nalepka, 1998, 169).

The likelihood of success is increased when the enterprise can say that the following formula applies: "opportunities + strengths > threats + weaknesses" (Nalepka, 1998, 169).

In order for the restructuring programme to be effective, the company is required to meet several important conditions that have a significant impact on the success of the restructuring, namely:

- determination of specific areas in which changes will be made,
- conducting an in-depth strategic analysis of the company to determine the necessary, measurable goals of restructuring; restructuring activities undertaken by the company should be realistic, and capable of adapting the organisation to a specific development strategy,
- precise identification of funds necessary to achieve set goals and specific operational activities (deadlines for individual projects, the appointment of those responsible for their implementation, and preparation of a schedule and restructuring plan) (Zakrzewska–Bielawska, 2004, 6),
- the enterprise is based on a clear strategic plan that determines the amount of material resources necessary to complete the restructuring process,
- the involvement of the entire management team of the organisation in restructuring activities, as well as the development of the concept and schedule of introduced changes,
- improving the information transfer within the organisation, negotiating with the company's social partners, as well as trade unions,
- support of the management in case of necessary restrictions resulting from surplus employment, or skilful management of these surpluses,

- rational management of the company's financial resources to avoid waste and overpaying in a special situation when the company should economise (Nalepka, 1998, 169).

Unfortunately, failure to comply with the above-mentioned conditions may result in the failure of restructuring activities or even a deeper crisis within the enterprise. Therefore, the restructuring process should be meticulously and objectively pursued, striving for the direct implementation of conditions that guarantee its success (Nalepka, 1998, 170).

5.2. Opportunities for the restructuring company

In spite of many threats appearing in the company's environment as well as inside it, many opportunities are also opened up which are related to the implementation of the restructuring process. However, opportunities must be fully utilised by the company, and their full use depends on:

- programme content,
- conscientiousness in terms of implementation,
- the level of personnel determination in seeking to rectify the situation,
- the degree of overcoming adversity and resistance associated with making changes (Nalepka, 1998, 172-173).

The decision to undertake restructuring may be extremely difficult for many enterprises; however, it should be remembered that taking it brings many opportunities, such as:

- the ability to closely look at the problems that are occurring in the enterprise,
- the accurate assessment of the company's position and diagnosis of its problems,
- raising awareness of the necessity of making changes and focusing the attention of the staff on the common goal, which is to improve the company's situation,
- creating a new organisational culture,
- improving the skills of the managerial staff,
- improving the flexibility of the company's operations,
- creating an information base that helps in the decision-making process,

- increased focus on marketing activities - improvement of customer service, new patterns of operation, expansion of the distribution system, improvement of the quality and attractiveness of products, and production adapted to market needs (no oversupply phenomenon),
- improvement of the company's financial efficiency through increasing financial liquidity and better management of company's resources,
- adaptation of the company to new legal regulations.

The success of the restructuring process is highly dependent on the conditions prevailing in the company's environment and within, as well as on the extent to which the enterprise will be able to take advantage of opportunities, but also to protect against the emerging threats brought about by the restructuring process. It is also extremely important to prepare an appropriate and methodologically correct programme for the implementation of changes and the ability to manage them (Nalepka, 1998, 173).

5.3. Barriers accompanying the restructuring

As for the barriers accompanying the restructuring process, their presence certainly affects the efficiency of introducing changes in the enterprise. In order for the restructuring to be successful, it is necessary to clearly identify the potential and actual obstacles hindering the implementation of this undertaking. Awareness of the existence of barriers and the knowledge of how to mitigate their effects by bypassing them or eliminating them altogether is crucial here and affects the effectiveness of the restructuring process to a large extent. Such barriers can be divided into three groups: market and economic and financial barriers, organisational and formal legal barriers, and psychosocial barriers. Market, economic and financial barriers include:

- price increases and uneven competition,
- lack of adequate financial resources for development and investments,
- the terminal financial situation of the company through the implementation of restructuring, debt, and lack of financial continuity, which often brings about a deepening of the crisis and hinders the effective implementation of changes,
- outdated technologies and machines that require considerable financial outlay, and at the same time are incapable of producing modern products (Zakrzewska–Bielawska, 2004, 7).

Organisational and formal-legal barriers include:

- vaguely defined long-term objectives of the company or lack thereof, leading to disorder in the enterprise, because activities that are effective in the short term may not be effective in the long term,
- too frequent fluctuations in the management division of the company that cause destabilisation, because each new president introduces his own management methods and makes his own changes, often without taking into account previous achievements,
- lack of uniformity in terms of the company's operations - complicated and inconsistent legal regulations, or erroneously conducted tax policy, which causes restrictions on the development of products, or an incorrectly functioning IT system that provides unreliable, imprecise information. Information is often delivered too late, which prevents the company from making a correct and quick decision, which is crucial for companies going through a crisis,
- incorrectly defined goals of the restructuring process, and the erroneous perception of common goals by all departments in the enterprise, as a result of which these departments strive to achieve their individual goals, not acting for the good of the company as a whole (Zakrzewska–Bielawska, 2004, 7).

Psychosocial barriers include:

- workers' opposition to changes introduced in the company, which results mainly from fear of the unknown, fear of failure, reluctance to change, lack of information, loss of jobs, and lack of perception of benefits resulting from changes, lack of a motivational system that should be developed by the management to encourage employees to work more efficiently, unfriendly atmosphere in the company, lack of willingness to work, apathy,
- low levels of creativity in the activities of the managerial staff, directed at the company's problems, illusory hopes that the crisis will be resolved from the outside, e.g. the government completely deleverages the enterprise,
- employees' uncertainty about the changes being introduced, by the bad situation of the company and concerns about its collapse, which may lead to the loss of jobs through reduction of employment, which is very often associated with restructuring. There are a number of barriers and obstacles that a company may

encounter when implementing a restructuring programme. However, it outlines areas that should be subject to specific attention. Thanks to this, it will be easier for the company to determine in which spheres it may encounter phenomena that may have an adverse effect on the proper conduct of the restructuring process (Zakrzewska–Bielawska, 2004, 8).

Summary

When summarising a well-executed restructuring, it can prevent a deepening of the crisis in the enterprise (restructuring) or intensify its development (development restructuring), regardless of what type of restructuring we are dealing with, as well as the reasons for its implementation. The restructuring process can be considered properly carried out if we limit ourselves to seven key steps. The first is a quick and accurate diagnosis; the second is proper leadership and empowering the right people who will carry out this process; the third is a clear restructuring plan; the fourth step pertains to priorities; and the fifth refers to correct communication with interest groups. In addition, you must be consistent in your action (step six) and have a clear vision of further development (step seven). The above-mentioned points are confirmed by the analyses of numerous enterprises which have successfully completed the restructuring process, as well as the practical experience of one of the authors of this article.

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CHAPTER 11

ANALYSIS OF THE RESTRUCTURING PROCESS OF POCZTA POLSKA SA

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Abstract: In certain situations, adaptation and restructuring activities play a key role in limiting and/or completely eliminating the possible effects of negative changes or trends that occur in the internal environment or the external entity. Properly planned activities and the appropriate manner of implementation should positively affect the financial condition of the company, as well as ensuring its stability. Developmental, corrective and preventive actions can, or even should, constitute an element of building a competitive advantage achieved as a result of rational and adequate reactions to these changes. The purpose of this article is to analyse the restructuring process at Poczta Polska SA. The research methods used in this article are: analyses of reports and statistical data, as well as internal documents of the entity, namely Poczta Polska SA. This article assumes that properly conducted restructuring activities guarantee company stability and maintain its market position. It was also assumed that both remedial and developmental actions can build a competitive advantage. The article presents an analysis of restructuring measures taken by Poczta Polska, starting from the company's designation of restructuring goals, to formulating a recovery plan and clarifying strategic tasks. Subsequently, an analysis of the restructuring activities undertaken by the company was performed, based on set goals and strategic tasks. In addition, the article shows activities that were the answer to the threats on the postal market at that time, which were supposed to contribute to the defence of revenues

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and the generation of profit by the company. The collected research material has been presented using a chart and tables and augmented with comments.

Keywords: restructuring process, restructuring, change management, Poczta Polska SA

Admission:
Poczta Polska SA (PP) is the largest postal services company on the domestic market, and its history dates back 460 years (it was founded in 1558). In Poland, there are approximately 7500 outlets, postal agencies and branches which provide services to individual business customers. It is also one of the largest national employers, with nearly 80,000 employees. The company's mission statement is: "Trusted, close, safe Polish mail. It delivers satisfaction." On the other hand, the company's vision assumes that Poczta Polska is to be one of the three largest distributors in the field of sent parcels for business customers in 2020, the largest integrator of administrative, communication and financial services for individual clients, and is to be listed on the Warsaw Stock Exchange (Annual report, 2014, 12).

1. Determinants of restructuring, strategic plan of the company

With the entry into force of the provisions of the Act of 23 November 2012 on Postal Law and the definition of new regulations and rules of the postal market, Poczta Polska had to face numerous new challenges. Opening the market to competition, according to many experts' forecasts, would mean significant financial losses in the area of postal services.

In addition to the liberalisation of the postal market and the marked threat from the competition, there were also several unfavourable factors that could have adversely affected the company's financial results and even its further functioning. An unfavourable phenomenon for the company was the development of e-substitution and alternative forms of communication. Most people prefer to send an SMS or e-mail instead of using a standard mailing letter. The main reason for this is, of course, convenience, but the costs are also important. SMS and e-mail are free, but to send a letter, you must pay for the envelope, stamp and shipping service. In addition, an increasing number of individual customers, as well as businesses, have decided on courier services, based on faster execution time, the convenience of sending packages and favourable pricing

conditions. It is true that the company is also active in this market, with many successes, but it does not have a leading position and faces strong competition from other courier companies.

To counteract the above difficulties and limitations, the company formulated a recovery plan for 2013-2014. The plan assumed that the company would undertake a number of restructuring activities aimed at:

- an improvement in the indicators regarding the availability of services and their timeliness,
- an improvement the quality of transport services,
- the intensification of sales,
- increasing the volume of sent parcels,
- the development of electronic services,
- increasing revenues from the new product offer (mainly on the KEP market),
- the defence of revenues from traditional services (Supreme Audit Office 2015, 37).

It is worth analysing why such restructuring goals were set by PP. Thanks to its exclusivity in terms of traditional letter items, it can be said that the company had guaranteed revenues at a given level and did not have to worry about competition. In 2012, with the entry into force of the law ordering the demonopolisation of the postal market, PP lost this exclusivity, and at the same time many of its existing clients, which obviously entailed a significant loss of revenues. Due to this fact, many branches became unprofitable because many buyers started using the services of the competition. Therefore, it was necessary to liquidate unprofitable outlets, the maintenance of which required a considerable amount of money. Moreover, along with the liquidation of many branches, a reduction in employment was planned - the number of clients served has changed significantly, which is why maintaining a high level of employment was unprofitable for the company. The intensification of sales and increase in revenues from modern services mainly concerned the KEP market. The dynamic development of this market even forced Poczta Polska to adapt to the trends and regulations prevailing on this market. The company's entry into this market was necessary to make up for the losses resulting from the decline in sales on the traditional parcels market, as well as to expand its offer to include new services. Other restructuring goals, such as the improvement of indicators regarding the availability of services and their timeliness, the improvement of the quality of transport services, an increase in the volume of shipments sent, and the development

of electronic services are development objectives which also had a significant impact on the company's financial results and market position.

In addition to the restructuring goals set above, the Management Board of Poczta Polska accepted the so-called "Strategic Directions of Poczta Polska SA until 2015" in 2011. From year to year, the assumptions of the strategy were updated, and development was based on the assumption that PP would be the designated operator by 2015. However, common sense held that the document also included the preparation of the company for competition on the free market. The document also assumed that the company's strategic goal in financial terms was to attain a satisfactory level of the company's net ROE, employee income and gross profitability. When it comes to strategic goals of the company focused on customers, the company first of all had to achieve an appropriate rate of customer satisfaction from the services offered. Level indicators are company secrets, and they are not widely available (Supreme Audit Office 2015, 37). The strategic tasks of PP were, among others:

- liquidation of unprofitable post offices, optimisation, and modernisation of post offices,
- reduction of employment level, and development of KEP market services,
- implementation of new services to expand the company's offer,
- increasing the indicators of availability and timeliness of services offered,
- improvement of customer satisfaction, using the company's services and products.

The liquidation of unprofitable outlets and reduction of employment levels were to free the company from the large and unavoidable costs associated with the financing of facilities that did not generate any profits and the maintenance of employees whose potential could not be effectively used. In addition to the liquidation of branches, the company was also to undertake a programme of optimisation and modernisation to meet the requirements of its customers. The optimisation of branches, as well as other activities such as the development of services on the courier market, the introduction of new products and services to their offer, an improvement in levels of customer satisfaction, concentration on the improvement of availability and timeliness indicators, and developmental tasks were aimed at helping the company achieve the relevant financial results and achieve success.

Strategic tasks were to be fulfilled by implementing strategic programmes that covered the most important spheres of the company's operations. In the event of their correct implementation, the company was to achieve benefits, such as:

- a transparent organisational structure,
- a modern sales network,
- competent and motivated staff,
- an offer tailored to the client,
- marketing sales support,
- improving the company's image, improving customer satisfaction with the products and services offered, as well as improving customer satisfaction with their service,
- increasing the satisfaction of employees, maintaining stable revenues,
- increasing operational and cost-effectiveness,
- streamlining company management (Supreme Audit Office 2015, 53-54.

2. Analysis of the course of restructuring activities

The most important restructuring activities carried out by Poczta Polska SA included a change in the management of the company from a horizontal management structure to a vertical one. The company believed that the resulting change in the management of the centres and departments would reduce employment costs, as well as improve the flow of information to executive centres. In place of the so-called "mail centre", the following departments were created:

- Sales division,
- Financial services development department,
- Postal services development department (Supreme Audit Office 2015, 55).

As part of the centralisation of the company's management, 116 director positions were liquidated, of which 98 were positions in district departments. Subsequently, 78 director positions were created - 44 in the newly established departments and centres and 34 in network regions. Thanks to the changes carried out in the company's organisational structure, intermediate links were created between the management of

Poczta Polska and newly created organisational units, which significantly improved the flow of information and decisions within the company. It is worth adding that changes in the management of a given enterprise in many cases affect the proper functioning of other organisational units within the company. Therefore, it was a very important change for Poczta Polska (Supreme Audit Office 2015, 55).

In 2011, Poczta Polska employed approximately 80,000 employees. Having such a large number of employees was unfavourable for PP, which is why the company's authorities decided to reduce employment. The main rationale behind such a decision was losing the tender to service prosecutors' offices and courts. It is estimated that the company lost 290 million PLN due to the lost tender, a serious loss that significantly impacted upon the company's financial results[3].

Employment at PP was adapted to the situation prevailing on the postal market and trends occurring within. In addition to the lost tender, a serious problem for the company was also posed by the decline in traditional postal services. Therefore, it was necessary to take appropriate measures to prevent further loss of funds or to mitigate the effects of adverse events in the company's environment (Annual report 2014, 55).

In such a situation, the fastest action, the effects of which are visible in a short time after its implementation, is to reduce the size of the workforce. Therefore, Poczta Polska decided to dismiss part of its staff. Mass redundancies are often met with intense criticism from workers and citizens of the country when they learn about their implementation. Therefore, to alleviate unfavourable reactions from society, PP introduced the so-called Voluntary Leave Programme. This programme proved to be a good idea, because from 2011 to June 2014 about 12,000 people benefited from it, and by introducing this programme PP prevented many possible confrontations with their employees, and even strikes (Tokarczyk, 2018, bankier.pl).

The reduction of employment not only applied to employees of post offices, but also in other professional groups such as:

- management,
- support,
- postmen (Annual report, 2014, 51).

[3] Poczta Polska cuts costs: reduces employment. [In:] Polish Radio https://www.polskieradio.pl/42/273/Artykul/1157917,Poczta-Polska-tnie-koszty-zmniejsza-zatrudnienie (access 14.06.2018 r.)

Due to the consequences of the decision related to the exemption of postmen, which are analysed further, it is worth presenting a table showing the number of PP postmen and the decrease in this figure over the years 2011-2014.

Table 11-1. Number of Poczta Polska outlets in 2012-2015.

Date	01.01.2012	31.12.2012	01.01.2014	30.06.2014	31.12.2014	30.06.2016
Number of branches	8384	8452	7870	7724	7527	7476

Source: own study, based on Supreme Audit Office: Restructuring of Poczta Polska SA ..., op.cit.

As can be seen from the table above, the company adapted to the legal regulations related to maintaining a suitable number of post offices. When the postal market became demonopolised, these regulations were abolished, and as a result the company began to gradually liquidate its branches. From 31 December 2012 to 30 June 2015, Poczta Polska liquidated as many as 976 branches. Despite the liquidation of nearly 1000 unprofitable outlets, Poczta Polska decided to modernise existing outlets and optimise them in terms of market trends. The company opted for a modern service model, transforming post offices into friendly customer service points. For example, in 2014, Poczta Polska had 100 revitalised facilities, in which there were self-service zones open 24 hours (Annual report, 2014, 16).

The transformation of selected post offices was carried out while creating new ones. The outlets were created in places which were easily accessible to customers, e.g. housing estates, shopping centres, etc. At the end of 2014, the company could boast of 204 outlets functioning in the new model (Annual report, 2014, 42).

The number of self-service trading areas also gradually increased. At the end of 2014, 280 such zones already existed (Annual report, 2014, 43).

The company also invested in modern equipment to improve the quality and availability of products and services offered. An example of a modern machine is the so-called "ZUSomat," a device thanks to which clients can fulfil their obligations towards the Social Insurance Institution. Using "ZUSomat" machines, customers could - among other things - submit various types of documents and applications, and also use the ZUS online service. In addition, the company purchased modern IT equipment, for example desktops, notebooks, and radio scanners which were

connected to the LAN network to freely send internal company data, and to facilitate the work of its employees (Annual report, 2014, 51).

The process of the revitalisation of post offices was highly complex. The modernisation of outlets and the installation of modern equipment was not the only stage, as the relevant competences of the employees were also important. To this end, Poczta Polska, by conducting internal training or using external companies, has trained over 80,000 employees so that they can contribute to the company's success and carry out its mission (Annual report, 2014, 55).

PP has carried out many corrective actions and development activities to improve the timeliness and availability of its products and services, as well as to improve their quality. In order to improve the availability of their services, in addition to optimising outlets and their deployment, it was also necessary to optimise the arrangement of mailboxes, which are placed in the local postal area by the designated operator. Having a total number of mailboxes unsuitable for the number of letters sent to them caused considerable difficulties, e.g. the overflow of letter boxes in a given area. Referring to the data presented in the table below, a significant decrease can be noted in the number of boxes installed. The biggest differences can be observed in the case of rural areas, where at the turn of 2011 and 2014, letter boxes were being gradually removed; by 2014, as many as 8542 boxes had been removed.

Table 11-2. Number of mailboxes in Poland, by urban and rural areas.

Year	**2011**	**2012**	**2013**	**2014**
Number of transmitting boxes in the countryside	24871	20974	18164	16329
Number of transmitting boxes in cities	15492	15015	14661	13585
Altogether	**40363**	**35989**	**32825**	**29914**

Source: own study, based on Supreme Audit Office: Restructuring of Poczta Polska SA ..., op.cit.

Another issue regarding mailboxes was their incorrect installation. In many cases, they were installed too high, which made it difficult for disabled people to handle them. Although the method of solving the problem seemed trivial (installing the box slightly lower), it was not always possible to do so. The main reason for this phenomenon was the lack of consent of the owners or building administrators to replacing the

mailboxes, so that their installation in accordance with the applicable requirements was impossible.

An equally important aspect is timeliness. Due to intense competition on the mail and courier services market, this indicator becomes particularly important. In order to improve the timeliness of its services, Poczta Polska has invested in sorting packages, simultaneously challenging many companies operating on the courier market. This sorting plant has enabled the delivery of 2.5 million parcels per month, which has significantly streamlined the entire order completion process and improved its timeliness.

Poczta Polska is successively investing in subsequent sorting plants that are being installed throughout the country. Despite the fact that these are huge investments (one sorting plant costs approximately PLN 50 million), the company believes that ensuring timely deliveries to its clients will allow it to gain an advantage over its largest competitors, among others the German company DHL, the American company UPS and the French company DPD (Business Insider 2018).

In 2014, the company invested in eight sorting machines for letter items, which were installed in Warsaw (three machines) and in Zabrze (two machines). The rest of the machines were placed in Pruszcz Gdański, Lisi Ogon and Wrocław. In addition to investments in sorting machines, PP also invested in delivery vans. Such an action also improved the timeliness of services, due to minimising the risk of failure of outdated vehicles; in addition, it reduced transport costs and depreciation costs due to modern technologies and the high-quality materials from which cars are currently produced. In 2014 the company leased 320 trucks, with a total weight not exceeding 3.5 tonnes, 54 universal vehicles (over 3.5 tonnes), as well as 85 highly specialised bankers, or vehicles for transporting valuable goods or high sums of money (Annual report, 2014, 51).

The demonopolisation of the postal market and the constantly increasing value of the courier market forced Poczta Polska to introduce specific measures in relation to the above-mentioned problems. Despite many barriers to entering the courier services market (high competition; a large percentage share of the market held by leading players), the company managed to emerge on this market, occupying fourth position in terms of market share, and Poczta Polska's strategy for the coming years defines the services of the KEP market as one of the company's leading pillars. The company achieved this success thanks to perfectly planned activities and the reorientation of its offer.

Thanks to the well-developed transport network, in 2014, PP transported almost 6 million shipments, which is 50% of the total volume of packages shipped by the company, and this number continues to rise.

In terms of courier parcels, the company has introduced individual services characterised by satisfactory availability and a high percentage of shipments on time. These services are:

- Pocztex courier 48,
- Parcel 48,
- Parcel 24,
- Parcel EXTRA 24.

Courier services on the foreign market were also introduced. An example of such a service is the "UKRAINE PLUS Package", which was added to the company's range of services in June 2014. Thanks to this service, the customer can send a shipment of up to 30kg to any destination throughout the Ukraine at an attractive price. In the case of this service, it is also possible to track the status of the parcel on the Poczta Polska website. Numerous successes in the mail courier market also owe a debt to highly developed IT systems that support KEP services, such as the so-called "Electronic Sender", which is an interactive tool used to send parcels over the Internet (Annual report, 2014, 33-34). This tool is characterised by its unusual simplicity in use. All you need to do is log in to the site, fill in the data, print the label, pack the parcel, send it to the courier or post office, and then wait for it to be delivered. Of course, the course of the delivery process can be tracked via the PP website or the mobile application (What is an electronic sender, 2018). The implementation and development of services from the above areas allowed the company to defend revenues and losses resulting from the liberalisation of the postal market and threats from e-substitution. In addition to the restructuring measures described above for improving timeliness and improving the quality of transport services (purchase of cars, sorting), as well as the introduction of new services on the KEP market, Poczta Polska is successively implementing pallet shipments, which it has introduced to its range of services in the past. From year to year, the company's revenue from this service has almost doubled:

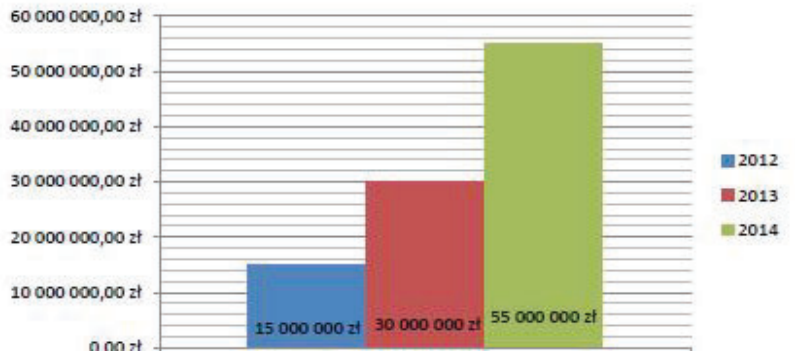

Fig. 11-1. Annual revenues from pallet shipments in 2012-2014 (million zł)
Source: own study, based on Poczta Polska: Annual report 2014 ..., op.cit.

As can be seen in the above chart, in 2012-2013, the company recorded an increase of 100%, while in 2013-2014 the corresponding figure was 81%. Such large increases testify to the company's effective efforts to develop this service.

An important improvement in terms of logistics services was the introduction and development of modern IT systems, such as the Transport Management System (TMS), which enables the collection of orders and supervision over the correct flow of shipments within the country (Annual report, 2014, 35).

Poczta Polska significantly expanded its range of insurance services in 2014. New services were introduced, such as OC, Autocasco, Assistance, NNW and real estate insurance. With these services, customers can take advantage of the Postal Financial Zones located in modernised facilities, as well as over 8000 licensed insurance agents. IT also played an important role in terms of insurance services. The company launched sales via mobile devices which postmen, for example, were equipped with (Annual report, 2014, 36).

Thanks to constant cooperation with Bank Pocztowy SA, Poczta Polska significantly increased its sales of banking services. In 2014, the company achieved a sales result which was 35% higher than in the previous year. The PP offer includes:

- term deposits,
- consumer loans,
- savings accounts,
- savings and billing accounts.

In particular, Polish Post undertook the sale of consumer loans. To this end, Bank Pocztowy launched an attractive loan offer with low instalments. This means that a client who provides an information form from another bank (a competitor of Bank Pocztowy) will receive better credit terms.

As far as savings and billing accounts are concerned, the company introduced loyalty programmes that bring numerous benefits to its customers instead of actively using the banking services offered by the company. These loyalty programmes include:

- PPU (Postal Insurance Programme) - refund of 10% of the premium amount for insurance if the premium is paid through an account at Bank Pocztowy SA.
- PPP (Postal Package Programme) - a refund of 10% of the resulting costs using selected postal services (mostly from letters and parcels).

In cooperation with Bank Pocztowy SA, the company is constantly increasing its customer base. The number of clients using PP banking services for 2014 was 1447 people (Annual report, 2014, 36).

Thanks to the modification of services in the field of traditional financial services, Poczta Polska effectively minimised losses in revenues resulting from the loss of its monopoly. Initiatives include:

- the launch of an internet platform that allows customers to make online payments, e.g. for an RTV subscription,
- a network of exchange offices, introducing over 800 currencies for exchange and improving access to these exchange offices, due to their launch in post offices,
- the introduction of a cash machine and postal orders,
- improved service in terms of foreign transfers.

The commercial activity of Poczta Polska is mainly based on the sale of magazines and newspapers. The company also recorded an increase in this area. In 2014, sales in outlets and the online store increased by over 30% compared to the previous year. The company owes this success to the introduction of self-service trade zones and a new system of exposition of magazines and newspapers in outlets (Annual report, 2014, 37).

The philatelic area is an important element of the company's activity due to the implementation of the company's mission in relation to the cultural (popularisation of culture) and historical (commemoration of the most important Polish anniversaries and notable events) spheres. As part

of its philatelic services, PP introduced a new service in 2013 - "My ZOOM". Thanks to this service, clients can create their own, personalised postage stamp. It is an excellent solution for entrepreneurs who want to promote their brand. Customers have very warmly accepted the new Poczta Polska service, which is confirmed by the consistent increase in revenues from this service (Annual report, 2014, 38).

3. Conclusions and recommendations

Poczta Polska has restructured many areas of its operations. Many remedial or developmental actions have significantly improved the company's position. However, some activities did not bring the expected results. The liquidation and modernisation of post offices only partly resulted in the intended effect. First of all, through the liquidation of unprofitable outlets, the company managed to save large sums of money that could have been spent on modernising existing facilities. Unfortunately, the liquidation of branches resulted in significant restrictions related to the availability of the company's services, which caused considerable dissatisfaction among PP clients. Moreover, indicators regarding the availability of postal services have significantly deteriorated. Nevertheless, the liquidation of post offices was a necessary activity and brought benefits to the company in the form of savings, but also losses in the form of a decrease in customer satisfaction linked to the availability of postal services. On the other hand, the modernisation of post offices and various types of investments in new equipment (sorting, IT systems, cars) brought many tangible benefits to the company.

The sorting plant installation improved the timeliness and speed of the delivery process. Fast delivery is a key aspect of the courier industry, which is why so many companies strive to shorten the delivery time as much as possible. The introduction of modern information systems was also an excellent move that improved the availability of services in the area of e-commerce. The company's clients could do many things on-line, for example print a label, order a courier to pick up parcels, etc. In addition, the installation of information systems in post offices was a great help for its employees. These systems are highly transparent, which allows many activities to be carried out faster, constantly supervising the status of individual deliveries and intervening if necessary.

The purchase of cars was another step towards improving the timeliness of the services provided and reducing depreciation costs. The more cars a company has, the more it improves the timeliness indicator,

which is extremely important in the transport industry. Nevertheless, a larger number of cars is associated with higher costs related to:

- insurance,
- employing more drivers,
- maintaining vehicles in good condition.

Despite high costs, investment in new vehicles was necessary. It is true that the funds invested in cars could have been allocated to maintaining staff levels in post offices and indicators of access to services at a higher level, in order to prevent further decreases in levels of customer satisfaction. However, the purchase of new vehicles and the strengthening of the transport network were more important for PP. If not for this investment, the degree of dissatisfaction could have been even higher, due to possible logistics delays resulting from the lack of the above-mentioned measures.

The effects of restructuring measures in the field of employment reduction also caused considerable indignation among Poczta Polska's clients. As a result of the redundancies of many employees, there were queues at the windows, and many of them were completely closed. Due to the reduction in the employment of postmen and couriers, the timely delivery of parcels declined significantly. In many situations, there were unexplained cases of advice notes (recipients of parcels were at home and claimed that no-one came to deliver the parcel). The Polish Post, unfortunately, did not foresee the possible consequences of the dismissals of such a large number of employees. The company tried to improve access to its services by means of other methods mentioned above. However, failure in this area proves that adequate human resources are irreplaceable and extremely valuable. No modern software or IT system can replace a person who does his or her job well.

A significant amount of controversy was caused by changes related to the centralisation of company management. After the liquidation of the district directorates, many new centres and divisions were created. In each of these newly created units, new director-level positions were created, for which 34 people were hired. They received exceptionally generous employment conditions which, in turn, were the subject of numerous complaints addressed to the Supreme Audit Office by deputies to the Polish Government and postal workers.

Another issue is the remuneration system for 'director' positions. As mentioned, employment was reduced by nearly 13%, and the objective of reducing the vacancy rate was obvious - saving money that was to be spent

on the further development of the company. Despite the need to economise and the poor financial results of Poczta Polska, the remuneration of the management board in 2013 increased by over 156% compared to the previous year. According to the company's management, the remuneration of management board members does not differ from the average remuneration of other State Treasury companies, and is even below the average level. Nevertheless, the increase in the earnings of the company's management board members during such a period when the company was struggling with many problems aroused much controversy.

The entry into the KEP market and the intensive development of courier services by Poczta Polska are unprecedented, representing the company's greatest achievement in recent years. The decision to enter the courier market was made after the liberalisation of the postal market and was a very effective response to losses resulting from opening this market up to competition. Despite many barriers to entry, the company managed to enter the courier parcels market successfully. Of course, it required considerable investment, but the liquidation of branches and reduction of employment allowed for the accumulation of large sums of money which were allocated for development activities in other areas, including the development of courier services. Poczta Polska is doing very well on the KEP market, and investments have allowed PP to hold the position of one of the leading companies on this market within a fairly short time. The development and implementation of new logistics, insurance, banking, financial, commercial and philatelic services, as well as the introduction of marketing research in the form of outsourcing its offer, also allowed for the protection of revenues. Although revenues from these types of services do not constitute high percentages in the company's overall revenues for the whole year, they are an excellent alternative to acquiring additional funds that can later be invested in, for example, the development of the company's predominant areas or services.

After the entry into force of the Postal Law Act, when the requirement for a designated operator to hold a certain number of branches was lifted, a decision was made regarding the liquidation of branches and reduction of employment. The company, wanting to save as much money as possible, decided on quite radical, excessively spontaneous and aggressive restructuring activities, related precisely to redundancies and a reduction in the number of branches. It is true that PP managed to save a significant amount, but as a result of these activities, the availability of services offered has significantly deteriorated.

The Supreme Chamber of Control positively assessed the restructuring activities of Poczta Polska in general, although irregularities were also

found. The assumptions of the PP recovery plan show that the company was to focus on improving the level of satisfaction of customers with the services offered. Meanwhile, customers are outraged and dissatisfied with the deterioration of the availability of postal services. The dismissals of employees and the liquidation of branches are typical for corrective restructuring. The Polish Post Office decided, therefore, to partially reduce the potential of its operations, in order to reduce the costs resulting from financing unprofitable outlets and paying employees unnecessarily. Restructuring makes sense when the enterprise is aware of a possible crisis or one that is deepening. It is extremely important to anticipate and respond quickly to adverse changes in the company's environment or internal challenges. In the case of PP, this reaction was severely delayed; when the company's authorities realised the significance of the problem, they reacted very spontaneously, so that not all activities were duly planned and carried out. In addition, the company, with a monopoly on letter shipments and as a result of past successes and satisfactory revenues, did not treat the threat of demonopolisation sufficiently seriously, considering it to be a distant threat at worst. An adequately rapid response would have allowed the company to better prepare for such an eventuality, as a result of which it could have planned specific preventive actions or developed a solid strategy on how to operate on a fully liberalised postal market. Restorative restructuring is often a last resort, implemented when other less radical actions fail.

In summary, the PP authorities were late in reacting to the demonopolisation of the market and opening up the postal market to competition. Nevertheless, despite the late reaction and insufficiently well-planned activities, the Polish Post Office successfully coped with the above-mentioned problems, and most of the restructuring activities have been effective. They allowed the company to maintain its leading position on the postal market, to gain a foothold in the courier services market, and to generate added value from additional services. A negative effect of the restructuring was a significant deterioration in the availability of postal services; however, the company's leadership has announced that in the coming years they will focus on facilitating access to their services and will continue to fight for dominant positions on the market and to develop many areas of their activity.

Conclusion

Before the market was opened to competition, Poczta Polska was the absolute leader on the postal market due to the monopoly that it still

possessed in specific areas. In 2012 the company lost its exclusivity for letter shipments and the postal market was liberalised. As a result of this unfavourable event for the company, it lost some customers who defected to the competition, and the financial results of the company significantly deteriorated. In addition, the postal market has become seriously threatened by the substitution of postal services and changing market trends. In response to these threats, Poczta Polska has taken a number of restructuring measures to repair, reduce and develop. The liquidation of many unprofitable post offices, as well as reducing employment costs, enabled the collection of funds for development and investments in areas that allowed the company to maintain a stable position on the postal market. Introduced upgrades and modernisations (e.g. post offices, logistics network, and sales network) translated into the achievement of satisfying indicators relating to the maintenance of timeliness and availability. In turn, activities aimed at expanding the company's range of services offered and looking for new sources of income from alternative services not directly related to postal or courier services have contributed to the improvement of the company's financial condition. In summary, it can be generally pointed out that the restructuring of the analysed company was successful; Supreme Audit Office data indicate that, despite the irregularities found, the company achieved the majority of its objectives. Comprehensive restructuring activities implemented by the company enabled it to defend its position on the postal market and gain an advantage in the face of growing competition, as well as expand onto new markets.

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CHAPTER 12

FORMATION OF A STATE INSTITUTION ON THE BASIS OF A PROCESS ANALYSIS - THE CONCEPT OF THE INSTITUTION OF CADASTRE

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Abstract

The modification of the structures of public administration has encountered major obstacles. Institutional changes are difficult to introduce due to their complexity and broad impact. Non-substantial (political) factors are of importance as well. The resistance to change is aggravated by how difficult it is for decision-makers to assess the impact of the changes that are proposed.

We present a method of handling such issues based on the process approach, which allows one to take a critical look at the functioning of state institutions and to develop draft changes. We discuss its application

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in the creation of concepts of institutional changes relying on the example of the administration segment which handles geodesy and cartography in Poland.

The study consists of three parts: the introduction, which defines the purpose of the work and presents the issues, the method of conducting work, tools used, and the subject of research; the second part, in which the process of creating a cadastre concept is described based on the presented method; and the third part, namely the summary.

Keywords: public administration, public sector performance, ownership, investments, cadastre.

JEL codes: H83

Highlights:

- Public administration in Poland is not able to properly execute the tasks in geodesy and cartography that are imposed on it. Over 8000 employees in over 380 local government units located across all of Poland complete an excessively large number of tasks without any coordination.
- In public administration, one may apply the process analysis approach, which consists of referring to processes in which the administration participates, as distinguished from the applied process approach regarding processes arising from within the organisation.
- The use of this method makes it possible to answer the following question: to what extent, in regard to the tasks the state has today (in the example presented – in geodesy and cartography), should administration act and how should it be organised?

1. Introduction

1.1. Objective of the study

The purpose of the study is to demonstrate that the formation of state institutions should be preceded by an analysis of the socio-economic processes in which such institutions may participate.

1.2. Issues

- What problems should public administration handle? How should it be organised?

- How to focus the actions of administration on the customer?
- How to verify the tasks performed by administration in terms of the subsidiary principle?
- How to organise inter-institutional cooperation assuming that administration is a form of network composed of interconnected institutions?
- How to make it easier for politicians to take decisions with respect to the organisation of public administration?

We attempt to answer the questions posed above in our work.

1.3. Method and tools

During the multi-year analysis of geodetic and cartographic administration, it was concluded that institutional issues should be considered in the context of the involvement of such administration in the processes of ownership right transfer and investment right transfer.

During many years of work on improving administration, we were able to use the experience we had gained to create a method of developing organisational structures following the process analysis (called "By Process To Structure") in the following steps:

1. Check the current status and look for an answer to the following questions:
   - what is the structure of an organisation?
   - how does it perform its tasks?
2. Evaluate the organisation's efficiency based on its performance.
3. See what processes the organisation is involved in and improve those processes.
4. Create a concept:
   - identify the mission and tasks that an organisation should perform to participate effectively in improved processes,
   - determine the organisation's structure and its basic parameters.

Process analysis tools were used in the course of the work (mapping, reengineering, lean management), as well as benchmarking, time series analysis and forecasting, legal analysis, statistical analysis, analysis of organisational resources, interviews, and literature analysis. The knowledge and experience acquired during many years of optimising the functioning of geodetic and cartographic administration were also employed.

A graphical presentation of the processes was used, which made it possible to show important elements in order to facilitate understanding of their course and to point out their weaknesses.

1.4 Research object

The research covers the administration sector functioning in the area of geodesy and cartography (geodetic and cartographic services), with particular emphasis placed on improving the level of protection of land ownership rights (maintaining the legal order of land), on improving the efficiency of investment processes, as well as on optimising the efficiency of public administration.

The legal order of land referred to above is defined as an "ordered course of ownership boundaries of land that are protected by the state" [Nogalski, Klimek, 2014, p. 10]. The following conditions for legal order to occur have been determined:

- legal titles and land ownership boundaries are regulated,
- the state protects such boundaries (obligation stemming from art. 64[2] of the Constitution of the Republic of Poland) by official confirmation of the rights and ownership boundaries and by ensuring the ability to recreate the boundaries, should they be breached or seized,
- discernible legal awareness of society with respect to the obligations and rights of owners and with respect to the state's obligations in the scope regarding protection of land ownership rights.

At the current stage of work, an institution stands for an organisation, the activity of which needs to be explained and described before work commences on laying down the legal norms (legal institutions), on the basis of which such an organisation will operate.

The research object is the geodetic and cartographic service, with particular attention paid to geodetic and cartographic administration on the district level.

2. Development of the concept of cadastre

2.1. Organisation and tasks

The functioning of the geodetic and cartographic service (SGK) has been studied, with particular attention paid to geodetic and cartographic administration on the district level (AGK).

The structure of the service in question stems from the provisions of the Act on geodetic and cartographic law [UPGK, ch.2]. The bodies of SGK are: the Surveyor General of Poland (GGK), currently supervised by the Minister of Infrastructure and Construction (MIiB), and Voivode (Provincial Governor) performing tasks with the help of the Voivodeship (Provincial) Inspector of Geodetic and Cartographic Supervision (WINGiK), and the Marshal performing tasks with the help of the Province Surveyor (GW), and Starost or Mayor of a city with district rights (hereinafter: Starost) performing tasks with the help of the District Surveyor (GP). GGK and the Provincial Governor are the bodies of Geodetic and Cartographic Supervision (NGK), while the Marshal and Starost are the bodies of Geodetic and Cartographic Administration (AGK).

GGK oversees implementation of the state policy regarding geodesy and cartography; moreover he/she oversees and controls the activity of WINGIK, which in turn controls the actions of the Marshal and Starost (bodies of AGK) with respect to legal compliance.

Supervision and control do not contribute to unification in the functioning of the AGK bodies. The weakness of the supervisory authority is confirmed by the Supreme Chamber of Control (NIK), which "negatively assesses the functioning of geodetic and cartographic supervisory authorities in the performance of the tasks imposed by the Act..." [NIK, 2010]. The effect of this is significant differences in the functioning of AGK in particular districts.

The SGK organisational chart is presented in Fig. 12-1.

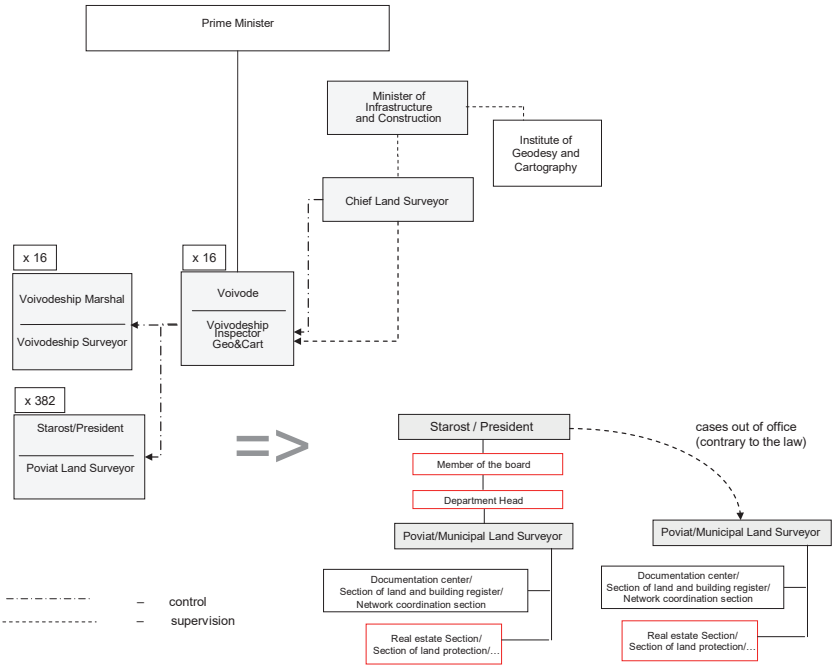

Fig. 12-1. Structure of geodetic and cartographic service
Source: Own study, based on [Nogalski, Klimek, 2014, p. 112, p. 114]

Since the key role in the implementation of SGK's tasks is played by the district level AGK, a number of studies have been carried out on this part of the geodetic and cartographic service.

The district-level AGK is located within the structure of the district starost office (or in the municipal office of a town with district rights). AGK is placed within the structure in various ways. Most frequently it is a division managed by GP, but in many cases, it is an organisational unit of a lower level. GP is often directly subordinate to the starost; however, there are cases when this subordination is indirect. Sometimes, an organisational unit (headed by GP) is separated out and placed outside the starost office, which is against the law.

GP performs AGK's tasks (determined in the Act on Geodetic and Cartographic Law), but such tasks as real estate management, agricultural land protection, etc., are also entrusted to GP.

Throughout the country, district administration employs over 8500 people, of whom over 2500 handle the land and property register

(otherwise known as the cadastre of real estate), while the remaining tasks are handled by 4700 people (the list of tasks can be found below). Other tasks are in the hands of over 1300 people. On average, a single starost office employs nearly 22 people, of whom 18.5 handle tasks. Table 1 presents the level of employment in a district AGK, divided into tasks performed.

Expenditure on AGK is nearly PLN 737 million per year, including salaries of PLN 445 million. Revenues (including government grants) of PLN 388 million cover 53% of the expenditure spent on handling AGK's tasks (47% of the expenditure is covered by local governments). Table 2 presents expenditure on the implementation of tasks of the district AGK and the sources of financing.

It should be emphasised that AGK concentrates on the tasks of government administration.

Table 12-1. Employment and Expenditure and revenues (PLN million)

Employment (2015)

Total	8 495
Including: handing of land and building registers	2 532
handing other tasks	4 674
other	1 290

Number of organisational units	382
Average employment in a unit	22.2
Including: handing f land and building registers	6.6
handing other tasks	12.2
other	3.4

Finance (PLN million)

Expenditure (2015)	cost of employment	444.7
	investment	47.8
	current expenses	149.0
	geodetic work	95.3
	total	736.8

Revenue (2016)	documentation of the land and building registers	121.9
	information release	52.9
	industry consultations	22.4
	notification of geodetic work	45.2
	certification	46.8
	access to notarial deeds	1.6
	designated subsidies	97.0
	total	387.8

Source: Own study, based on GUGiK data [GUGiK, 2015]

Employees of AGKs receive low salaries. This conclusion is based on the comparison of the average monthly gross salary in 2015 in:

- state administration [GUS, Table 14(35)]: PLN 5091
- government administration [GUS, Table 14(35)]: PLN 4347
- geodetic and cartographic district administration [GUGiK]: PLN 3698

District AGK carries out the following tasks:

- keeping a register of land,
- keeping a register of buildings (designed and built);
- keeping a register of premises,
- keeping a register of prices and value of real estate,
- keeping a register of: petrol lines, district heating networks, electric power network, gas network, sewage network, oil network, telecommunications network, water supply network, unidentified wires, other wires, underground structures, networks being designed, and transmission corridors (including technical data recording),
- keeping databases of all the listed registers and databases of topographic objects, detailed geodetic control networks, databases of meta data,
- harmonisation of databases,
- obtaining data from architectural and construction documentation and public registers,
- issuing decisions on entries into the land and buildings register, notification of entry,
- handling of contractors for geodetic works: registration of works, publishing (sale) of materials and services, verification of geodetic surveys, authentication of documents prepared by surveyors,
- collecting geodetic and cartographic studies and keeping records of collected documentation,
- customer service: providing information and issuing certificates on the data collected in registers, on maps and in sets of documents, creating, keeping, and sharing standard cartographic studies: cadastral maps and master maps, sharing databases or parts thereof,
- handling of property valuers,
- support to utility companies: coordinating the locations of planned utility networks,
- establishment of detailed geodetic control networks,
- protection of geodetic, gravimetric and magnetic signs,
- general real estate taxation and development and maintenance of real estate taxation tables and maps (not implemented),
- determination of administrative boundaries for the purposes of the State Boundary Register (PRG),
- participation in the development of the Integrated Real Property Information System and the National Land Information System,
- updating the land and property register,

- periodic verification of data contained in databases (in registers and on maps);
- construction of the database of Geodetic Register of Utilities Networks,
- development of the Topographic Structures Database,
- preparing lists, reports, surveys, etc.,
- continuous implementation of ever-changing regulations.

Over 8000 employees in over 380 local government units located throughout Poland work in independent local government offices, performing - without any coordination - an enormous number of tasks resulting from thousands of pages of ever-changing regulations.

2.2. Elements of the diagnosis

2.2.1. Key organisational defects

AGK units exhibit poor efficiency. Since their impact is so widespread (the notion of land or real estate can be found in over 360 acts), the defect negatively affects many other state institutions, reducing their effectiveness.

The key disadvantage that exerts an impact on the quality of institutions in the area of state functioning is the extremely poor institutional solutions which were initiated during the period of the Polish People's Republic and are still very much in use. The most important ones include:

- elimination of the function of a sworn surveyor (1952)
- elimination of the institution of the cadastre (1955),
- gradual departure from administrative procedures towards material and technical activities,
- introduction of the master map (1979) with the goal of developing an "all-encompassing" map,
- introduction of modernisation as a "repair instrument" for the land and buildings register (1979).

After 1989:

- the state's needs as well as its financial capacity were inadequately assessed. The mission of the geodetic and cartographic service was inappropriately defined,
- defective organisational solutions were proposed – administration as an organisation without structures (Fig. 1),

- an excessive number of tasks were imposed on administration,
- unnecessary information involving geodetic surveyors was collected,
- incompetent institutions resulted – municipalities deal with divisions and delimitations (tasks entrusted to professional sworn surveyors in other countries); geodetic administration keeps industry records of the utilities network, registers technical data of buildings, and keeps records of residential and commercial premises,
- there was a scattering of documentation concerning the boundaries of ownership and boundaries of plots (municipalities and districts),
- there was a lack of cooperation between state institutions, in particular inter-departmental (with courts),
- there were a significant number of defects in maps and registers, uncertainty pertaining to data quality (resulting from the applied update mode),
- legal standards were negligently constructed, error-prone, inconsistent (defective regulatory institutions),
- there was a lack of responsibility for the effects of "task inflation" assigned to administration[5].

Since 1989, legal regulations have been contained in the Act on Geodetic and Cartographic Law (UPGK) – the last act introduced during the period of the Polish People's Republic, which is permanently subjected to amendments. Administration continuously received an increasing number of tasks. The interference from geodetic and cartographic administration in investment processes increased to an irrational degree. Irrelevant targets delegated to this part of administration, constant changes in the laws, and transfers of SGK from one ministry to another have all led to losing sight of what is most important for the state – maintaining the legal order of land and keeping the required maps and registers that offer the precise scope of ownership rights (cadastre). At this point, starosts - where geodetic and cartographic administration is located - are involved in absurd actions involving collecting everything measured by land surveyors (an oddity on a global scale) and transferring the surveying results onto the so-called master map. The elimination of the function of a sworn surveyor has decreased the quality of the documentation of boundary courses. The modernisation of the land and property register has led to the collapse of system solutions and to the introduction of the obligation to periodically

[5] According to the assessment by the applicants, which was presented in the Regulatory Impact Assessment, the eight amendments to the Geodetic and Cartographic Law and 21 Regulations in the period of 2010 - 2015 do not have any financial implications for district governments (sic!).

review land and building register entries. The very expensive master map, due to the arduousness of maintaining it and poor documenting quality of the work performed by land surveyors, has become a source of little credible information.

In order to carry out all the tasks that have been imposed on them, the districts had to increase employment and salaries. This is not the right direction to take, as the vast majority of these tasks can be carried out by other competent institutions or business entities as part of their ongoing tasks. Some of these tasks should not be carried out at all. It is obvious that the governmental registers and maps maintained by geodetic and cartographic administration have become sets of enormous quantities of information, the credibility of which is next to zero.

The misguided "digitalisation" that reinforces the existing improper and ineffective institutions is resulting in the gradual worsening of the issues in geodetic and cartographic administration. Compiling databases without solving the fundamental problems of geodesy results in the creation of collections that cannot be properly updated, and hence are useless. The consequence of work carried out this way is an absolute waste of human and financial resources.

2.2.2. Assessment of the quality of data in the land and building register

The currently functioning system of land registration does not ensure access to good quality and credible data. The reason for this is faulty assumptions and the way of maintaining land register systems, both in the period of the Polish People's Republic (until 1989) and since 1989.

Another reason is the quality of work performed. The inspections of field work conducted by districts showed that the scale of irregularities was enormous: in the random selection of work subject to inspection, a level of irregularities was found in 30% of work (in the selection of work done at the discretion of the people responsible for inspection, it was as high as 100% (!))[6].

The low credibility of registers is reflected in the scale of discrepancies of entries between the register and the land and mortgage registers, which was nearly 90% [European, 2006, p. 51].

[6] The data were obtained in 2010 as a result of tests performed in 17 districts of Pomorskie Province.

The low quality of data is proven by the fact that a legal obligation has been introduced to periodically verify entries in the registers and maps [REGIB, § 54].

The most crucial defects of the land and building register are:

- discrepancies between entries in land and mortgage registers and land registers (removal of this defect requires the inspection of the files in land and mortgage registers and the documentation gathered in the state geodetic and cartographic resources),
- inconsistencies between entries in the land registers, cadastral maps and the documents constituting the basis for an entry,
- absence or poor quality of the documentation on the basis of which the entry was made, or inconsistency in the documentation describing the registered item or its component,
- lack of information on faults in entries (in particular, lack of information on the accuracy of the location of border points shown on the map – an EU requirement),
- a large number of technical entries (until 2014, the obligation of notification of changes applied to a small number of them).

2.2.3. Time-consuming geodetic work

In the period between 1995 and 2014, in what now constitutes Pomorskie Voivodeship (Province), approximately 820,000 notifications of geodetic works were registered. The time consumption of these works is estimated at 165,000 man-years. The work regarding boundaries accounted for about 74,000 man-years (45%), work on mapping for design purposes and as-built surveying accounted for the same amount (45%), and other work for approx. 17,000 man-years (10%).

Calculations were made on the basis of the duration of the work calculated for the Wejherowo district for the period 1995-2014. In Pomorskie Voivodeship (Province) as a whole, 8.2 times more work was performed in this period than in this district (the number of notifications was obtained from the starost authorities). It was assumed that the assortment structure of the work and the time of implementation throughout the area were similar.

In 2014, in the Wejherowo district, the average time needed to perform land division was 193 days; mapping for design purposes took 29 days; while an as-built survey took 41 days.

The time was measured from the day when the starost office was notified about the surveyor's geodetic work until the survey from the work

undertaken was accepted. In case of divisions, the data for the most recent years are underestimated due to the fact that, after the amendment of the regulations, the completed division of work does not take into account the actions related to the issuing of the decision by the municipality and placing border marks in the field (the data concerning the location surveying of the structures under construction have not been included, as the obligation to notify the relevant authorities of such work was introduced in 2014).

According to the assessment performed on the basis of interviews with representatives of geodetic organisations and district land surveyors, as well as based on the results of Polish nationwide competitions concerning the functioning of the units of district AGK, the outcomes obtained are among the best ones. One can, therefore, claim that they are close to the lower boundary in terms of the time periods required to perform geodetic works in Poland.

2.2.4. Forecasts of administration burdening

The relationship between the amount of work reported in Pomorskie Voivodeship (Province) and the GDP value in 1996-2013 was studied. It turned out that the correlation between the number of notifications and the nominal GDP is 0.95. This relationship is not coincidental – it is due to the fact that, for every construction investment, geodetic works must be registered three times.

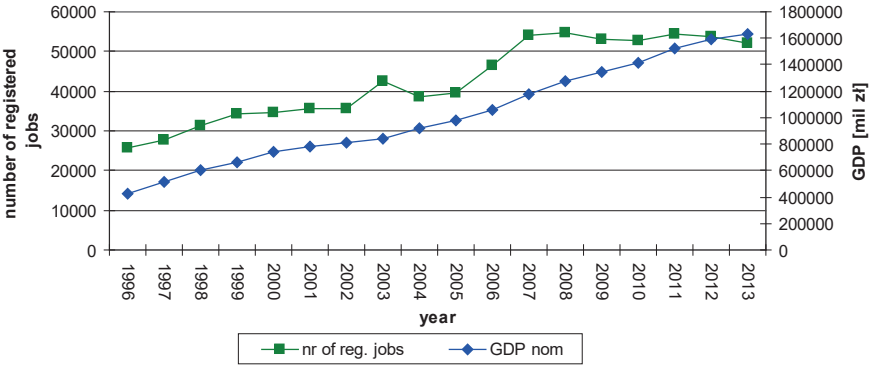

Fig. 12-2. Correlation between GDP and the number of registered works
Source: [Nogalski, Klimek, 2014, p. 130]

With such a strong correlation, one can state that the relation will be maintained, so the amount of work will increase.

The structure of registered work looks interesting in this context. The work referring to the land and building register (LBR) displays a minimum growing trend. The general rising trend (Altogether) is shaped by other work (Other), related to the participation of surveyors in construction projects.

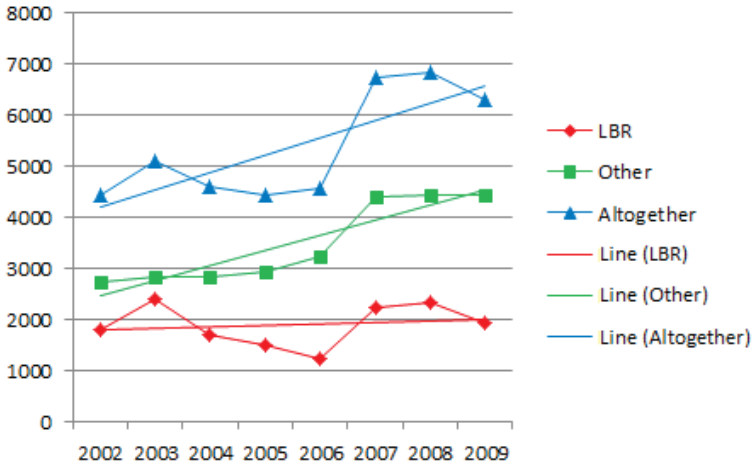

Fig. 12-3. Assortment structure of work undertaken
Source: [Nogalski, Klimek, 2014, p. 128]

2.2.5. Conclusion

The Geodetic and Cartographic Service is a structureless organisation, which cannot ensure the uniform functioning of administration in the country. The problem is further aggravated by locating AGK units in starost offices, and especially by the great distance between the authority and GP, the additional tasks GP is entrusted with, and deviations from the act (GP is outside the office).

Starost offices are unable to perform their duties properly; they are performed in various ways in different districts. The actions they take prolong the time taken for geodetic works. In light of how geodetic and cartographic administration is organised, the scope of its tasks, the level of employment, and the way in which its activities are financed, one should state that the geodetic and cartographic administration has lost its ability to

perform the tasks assigned to it. From a long-term perspective, there is no possibility of improving the quality of the functioning of geodetic and cartographic administration.

2.3. Analysis of processes

Bearing in mind that "an organisation is only as effective as its processes" [Rummler, Brache 2000, p. 76], one may claim that a state's efficiency depends on the efficiency of the processes therein, and especially the economic processes. The need to analyse these processes in terms of AGK's participation in them seems obvious. Therefore, one needs to choose the processes which are important for the functioning of the administration sector in question and to study them.

2.3.1. Justification for the selection of processes

The importance of the protection of ownership rights was recognised when the system foundations for the Third Republic of Poland were being created. It was reflected in the constitutional provision that imposes an obligation on the state to protect such rights (Constitution, art. 21]. This was validated by introducing the protection of ownership rights in the directives of the Washington Consensus on the conduct of economic policy [Consensus]. It has been long suspected that, among the institutional conditions for economic growth, protection of ownership rights plays a major role [Wojtyna, 2009, p. 190]. Taking into account Coase's assertion, R. Cooter and T. Ulen came to the conclusion that "ownership rights allocation can be crucial for the efficient use of resources when transaction costs are not zero" [Cooter, Ulen, 2009, p. 111].

Since land is one of the three factors of production (alongside labour and capital), the authors have verified the existence of the concept of land or property in Polish legislation, only to find that these concepts are referred to in more than 360 acts. Therefore, the conclusion is that knowledge in this respect is required in the broad area of administrative actions.

Real property plays a significant role in economic development. This is because it is more than a natural resource. Real property is the place of locating construction investments (in Poland, such investments make up for 50% of total investments).

The dependency between investment duration (duration of the investment process) and GDP has been determined in the following way [Nogalski, Klimek, 2011, p. 119]:

$$\Delta PKB_r \approx u_b * PKB * r / (100 - r)$$

where: ΔPKB_r – GDP growth resulting from reduced investment duration (T) by r%

r - indicator of reduced average investment duration ($\Delta T/T$) in %
u_b – share of construction investments in total investments (according to the Central Statistical Office (GUS) $u_b \approx 0.5$)

Thus, it was decided that it is justifiable to take actions aimed at the evaluation of the process with respect to the possible productivity gains achieved via reducing the time that is wasted by the investor, due to the requirement to meet the conditions imposed by the usually ineffective administration.

Given the object of this study, the process analysis is primarily focused on the actions in the field of geodesy and cartography carried out as part of such processes.

2.3.2. Transfer of ownership rights

Transfer of ownership rights to a part of property means that this part needs to be separated out. The subdivision is carried out by a surveyor based on a contract concluded with the owner. Before the work commences[7], the surveyor needs to register the work in the starost office. Prior to subdivision, the surveyor must determine the boundaries of the plot that is being divided, which is part of the property. If they are not well-documented (and there are many such plots), the surveyor must determine the course of the boundaries. Since the plot subdivision plan should be developed based on the current cadastral map, some districts require yet another notification of work and a submission of survey for the work aimed at determining boundaries. On the basis of the documents provided by the surveyor, an entry is made in the register. The entry is made in the material-technical mode, if – along with the surveyor's documentation – the owner's petition for entry was filed, or in the decision

[7] With each registration, the surveyor has to collect (for a fee) documents needed to perform the work (the surveyor may not use documents identical to those that he acquired or developed when performing other work).

mode (the entry is made upon the decision becoming final). Having prepared the subdivision plan, the surveyor files the survey documenting the performed work and obtains confirmation of the receipt of the submitted plan. Where the land and mortgage registers and records are incompatible (as commonly occurs), the surveyor draws up a document containing a list of "missing" changes in the land and mortgage register. The division plan is handed over by the surveyor to the owner, who in turn submits the application for approval of the division plan to the municipal authorities (attaching a few additional, albeit obligatory, documents). Where boundary determination is not possible due to a boundary dispute, a separate demarcation procedure will be carried out.

The documents handed over to the municipality are subject to an administrative procedure resulting in a decision. The final decision will be handed over to the starost office (either by the municipality, by the owner or by the surveyor), where, based on the decision, new plots are entered into the register. The entry is made in the material and technical mode.

On the basis of this decision, new boundaries of the plot should be marked on the ground (this action is not mandatory). The surveyor hired by the owner needs to once again provide notification of the work, and once the work is done, he or she has to file a survey with the office. The entry into the register concerning the marking of boundaries is made in the material-technical mode or by decision.

The starost office notifies the court (the land and mortgage register division) of the entry made in the data register covered by section 1 of the land and mortgage register. The court should introduce the change based on the notification. In fact, such a change is rarely introduced, and in the majority of districts it never happens. The main reason for that is the imprecise provisions (they do not provide for changes in the land and mortgage register on the basis of a notification of change in the land and building register; they are vague – the courts sometimes require additional documents). Moreover, considerable divergence between the entries in the land register and land and mortgage registers make it impossible to introduce changes. The fear of delay prompts the surveyors (urged by the client) to perform actions (draft documents) intended to make changes in section 1 of the land and mortgage register even before they are entered into the records.

Before a purchase transaction is made, the owner requests that the starost office should issue a certificate in the form of an excerpt and a map extract from the land register. Since, in the majority of cases, there is no plot in the registers covered by the transaction, the owner obtains an additional document from the starost office (or from the surveyor) to eliminate this defect. Moreover, in order to enter new plots into the land and mortgage register, a document is needed to allow the divided plot to be deleted (regulations do not provide for such a document). The owner obtains such a document from either the starost office or the surveyor.

After the sale-purchase transaction, a notary public hands over to the court a notarial deed along with the excerpt and map extract from the land register, as well as a list of land changes and a decision, here, on this basis, an entry of ownership rights is made in the land register (frequently before the rights are disclosed in the land and mortgage register). The register of prices and value of the property is also updated.

The court, on the basis of the petition submitted by a notary acting on behalf of the owner, establishes a land and mortgage register for the real property, makes an entry (pursuant to a ruling), notifies the owner of the entry and informs the starost office. The starost office, upon receiving notification from the court, enters the land and mortgage register number into the land register (however, the court may dismiss the petition without notifying the starost office of such a rejection).

Actions taken to determine ownership rights to land plots and plot boundaries are presented in Fig. 12-4. The right side of the diagram defines the part of the process, in which the subject of the property is determined by survey - in particular, its boundaries are established and the registration of the object is made. The left side of the diagram indicates the part of the process under which the ownership right to such an object is transferred and recorded.

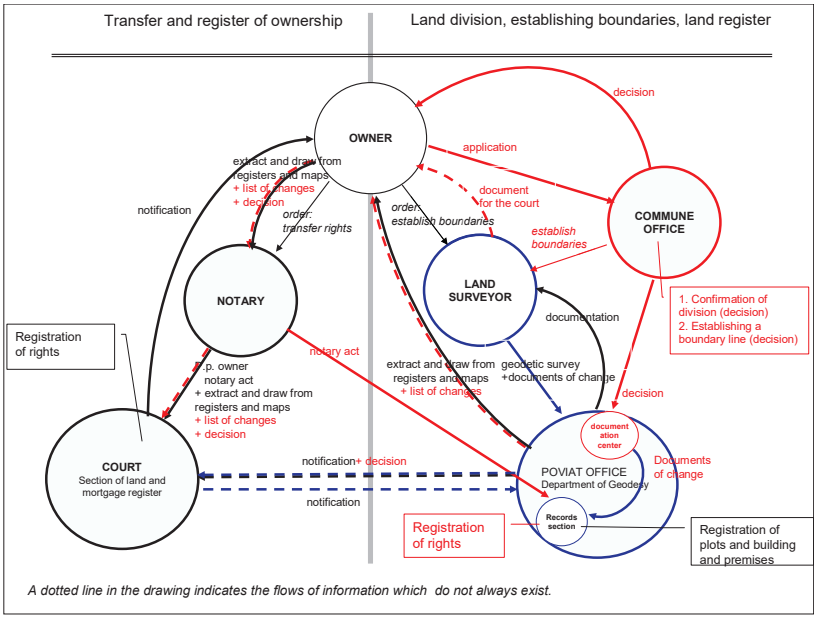

Fig. 12-4. The process of ownership rights transfer.
Source: based on [Nogalski, Klimek, 2014, p. 107]

It should be noted that when a land subdivision plan is developed, the surveyor must - at least once (but often two or three times) - register the works in the starost office and file work-related documentation in the form of a survey, as well as register and deliver (once again) the documentation from setting the land boundaries. At the starost office, materials need to be prepared and issued for each reported work, and once all work is over – control each survey (often this needs to be done numerous times) and update the land and building register.

The process is hampered by a number of flaws such as:

- participation of the municipality in the actions related to creation of plots and setting their boundaries, resulting in a significant increase in land acquisition time,
- independent submission of notarial deeds to courts and starost offices, and preparation of documents for courts by the surveyors, desynchronising functioning of the two systems,

- application by the administration of the material-technical mode when making entries, which makes the participation of the owner in the process impossible,
- multiple registrations of geodetic works, multiple inspections and registrations by the office,
- the fact that the legal position of surveyors is too weak; the surveyor's responsibility for his/her activities is insufficient and results in lower quality of documentation submitted to the starost office,
- diverse, excessive, often non-essential inspection of geodetic documentation by starost employees,
- insufficient involvement of the starost office resulting from the necessity of implementing a huge number of other tasks,
- the need for the owner to obtain additional documents (lists of changes) and to transfer them, through the notary, to the court,
- in court, the use of documents other than from the land register as evidence of entry (e.g. decision approving a subdivision).

The faulty process elements are displayed in the diagram in the following colours (Fig. 12-4) - red: elements to be deleted, blue: elements to be remedied.

2.3.3. Investment process

Given the object of this study, the analysis is primarily focused on the actions in the field of geodesy. In the description below, the part of the process related to investment area acquisition is omitted. The process is presented in Fig. 12-5.

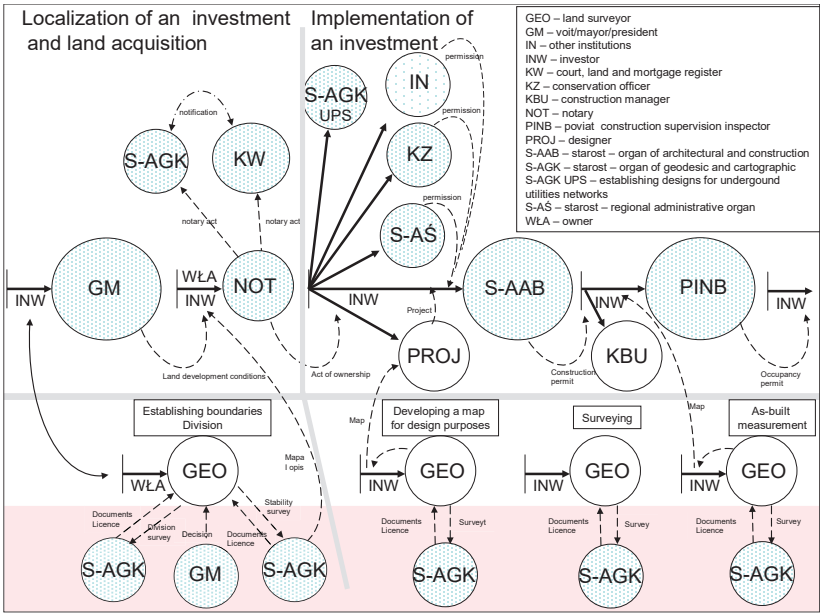

Fig. 12-5. Investment process
Source: based on [Nogalski, Klimek, 2016, p. 347]

When starting the investment, the investor (owner) hires a surveyor to obtain a map for design purposes. The surveyor, having received the order, notifies the starost office of the work. When preparing a map for design purposes, the surveyor is obliged to carry out, in the area provided for the investment, an inventory of terrain details and of underground utilities[8]; then he/she submits to the starost office (in the form of a geodetic survey) documentation containing, among others, differences found between the field situation and the map provided by the starost office (based on the documentation prepared by the surveyor, the master map is updated in the starost office). On the updated fragment of the map obtained from the starost office, the surveyor marks the details that are crucial to the investor.

Next, when the investment concerns a utilities network, the investor must provide the starost office with a map with the planned location of the network in order to obtain approval of the location. After the consultation,

[8] The provision lists 278 types of properties recorded on official maps [RBD, 2013].

the approval procedure is completed and the starost office records the planned course.

Upon commencement of construction work, the investor orders the surveyor to determine the location of the planned property. The surveyor is obliged to file a notification of works and a survey along with surveying documentation. Based on the documentation, the starost office updates maps and records. If the object is a building, the starost office enters the building data and its future location into the land and building register.

Once construction is complete, the investor is obliged to perform an as-built geodetic inventory of the location of the completed building. This task is given to the surveyor. The surveyor once again registers the work with the starost office, where he/she obtains the documents needed to perform the as-built survey and develops a map with the new or modified property. In the case of the inventory of underground utility networks, the surveyor is obliged to confirm compliance (or lack thereof) of the investment with the design. Having finished the inventory, the surveyor files the survey with the starost office. The map developed as a result of surveying is handed over to the investor, who attaches it to the application for an occupancy permit. Such a permit is issued by the construction supervision office. The measured properties are marked on the map in the starost office.

The participation of geodetic and cartographic administration in the investment process generates a number of drawbacks:

- keeping “double” records (most of the utility companies keep their own records),
- multiple registration of geodetic works, obligation to submit a survey for each of the registered works, official inspections of each survey, and the updating of extremely complex information sets by officials,
- obligation to acquire (for a fee) information that is unnecessary, or necessary but unreliable (in particular when designing investments)
- no liability for the effects of errors in the issued information about the location of network elements,
- the publication of sensitive data by the administration due to state security.[9]

The process area in need of repair is marked in pink in Fig. 12-5.

[9] cf. [White Book of National Security, p. 99]

2.3.4 Conclusion

The analysis of the processes shows fundamental institutional defects in the areas studied. In particular, it disclosed the excessive or faulty role of public administration in those processes. Adverse ramifications are visible, leading to lower quality of work, not only administrative work but also of many other entities dependent on the state administrative actions. Interference by administration blurs responsibility, resulting in lower quality of task performance. The prevalence of defective "products" of the administration in question adversely affect the efficiency of many state institutions.

2.4. Preferred directions for transformation

The key information needed by the state is data on the boundaries of ownership rights that make it possible to attain and maintain the legal order of land. Therefore, the state should have an instrument suitable for implementing the task. We consider cadastre to be the right instrument to maintain the legal order of lands. We have taken into account the definition of cadastre formulated by the Working Group of FIG supervised by Jürg Kaufmann and Daniel Steudler: a "methodically arranged public inventory of data concerning properties […] based on a survey of their boundaries" [Kaufman, Steudler] and Van der Molen's statement that a plot should be perceived as a site with specific boundaries [Van Der Molen, p. 16] (his standpoint is well reflected in Fig. 6 showing how the notion of cadastre has evolved).

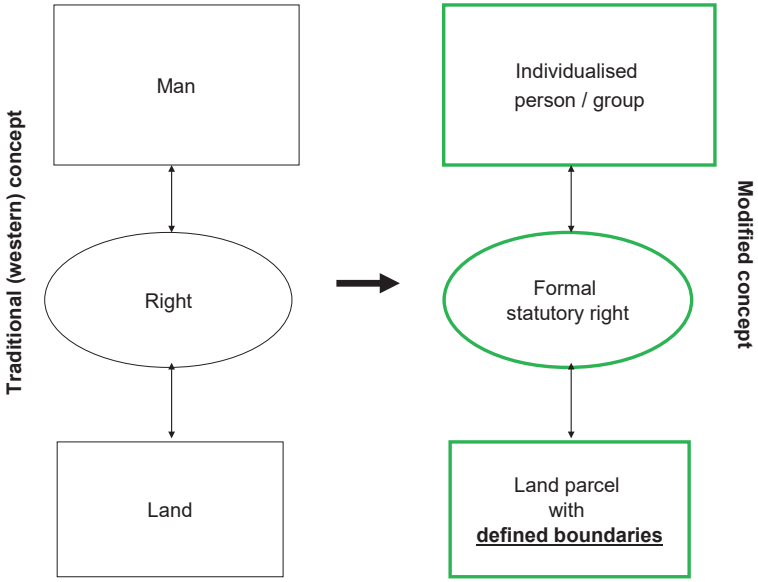

Fig. 12-6. Direction of change
Source: based on [Van der Molen, 2003, p. 16-17]

2.5. The concept of changes in the processes

2.5.1. Transfer of ownership rights

The importance of this process is broad – the notions of land or real property are invoked in over 360 laws. The maps and registers created as part of the process should be highly reliable when the scope of ownership rights is determined. Therefore, the quality of this process must be unparalleled – the end product, in the form of an entry into the register, must have the power of proof in many administrative proceedings.

Given that in Poland the institutions of cadastre and sworn surveyor did exist, the reintroduction of both was considered worthwhile.

As part of the transfer process of ownership rights (Fig. 7), the owner commissions the sworn surveyor, an institution analogous to the notary, works related to subdivision and setting boundaries. Moreover, the surveyor develops documentation of an official nature. The sworn surveyor hands the documentation over to the cadastre office, which keeps cadastral maps and registers. The cadastre office notifies the owner and the

court (land and mortgage registers) of the entry. The court changes the real property designation in the register, thus authorising a transaction to be made at the notary's office without the need to deliver the documents from the cadastre office.

Upon the receipt of the document confirming transfer of ownership rights from the notary, the court establishes or updates the land and mortgage register, referring the new owner's rights to the previously identified transaction property. The cadastre office, based on the court notification, enters the change of owner into the cadastre register.

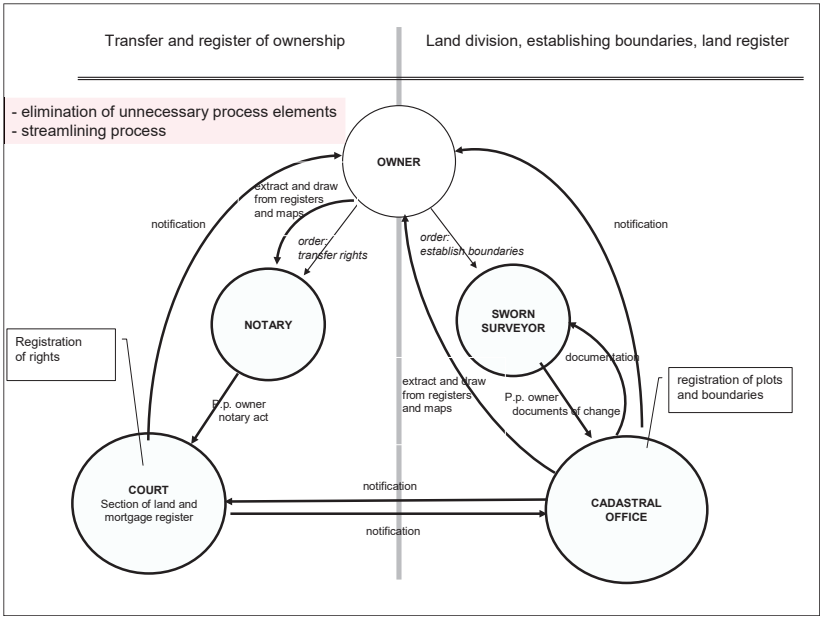

Fig. 12-7. Modified transfer process of ownership rights
Source: based on [Nogalski, Klimek, 2014, p. 143]

The effectiveness of the information exchange between the court and the office depends on whether the corresponding entries in the cadastre and land registers are consistent before the start of the process. To achieve such a state, inspections of land and mortgage registers, records, maps and sets of documents held by the court and the office would have to be carried out in the transitory period. Moreover, in the course of the process in which the owner participates, entries become incontestable. The process of data reconciliation is presented in Fig. 12-8.

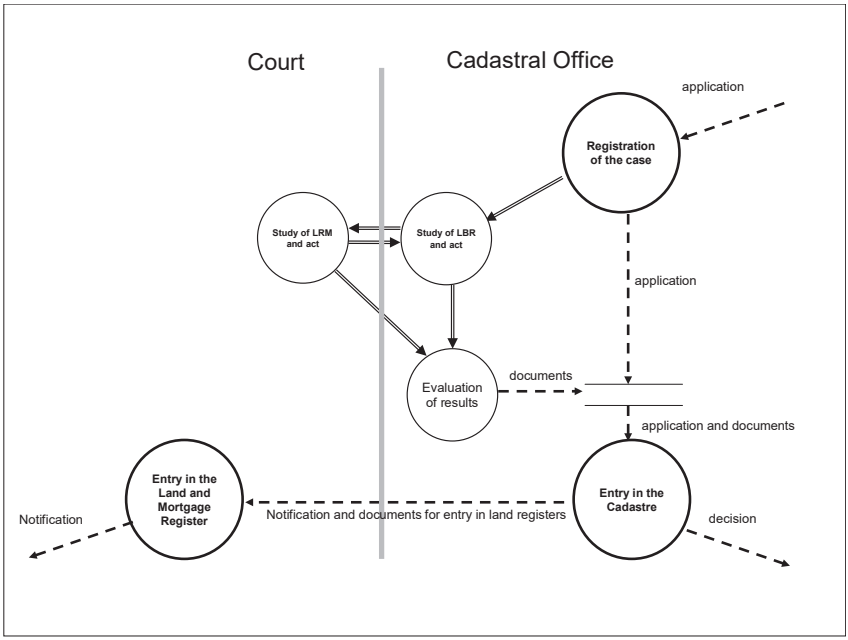

Fig. 12-8. Verification of the entries of Rights and Boundaries
Source: based on [Nogalski, Klimek, 2014, p. 143]

The process of ownership rights transfer becomes simpler in the case of assigning the competence with respect to registration of ownership rights to the cadastral administration (Fig. 12-9). Here, a notary submits a document confirming the transfer of ownership rights to the cadastre office. There is no need for the mutual exchange of information between the institutions.

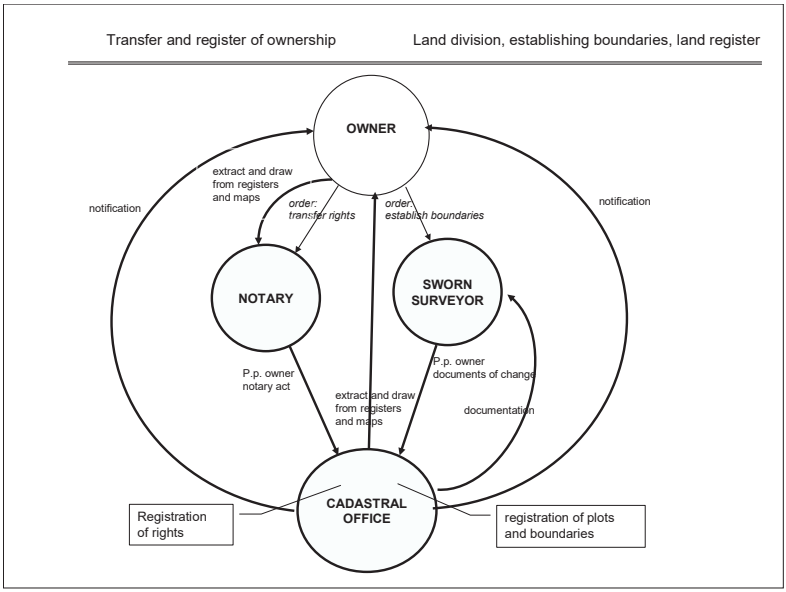

Fig. 12-9. Single institutional option of transferring ownership rights
Source: based on [Nogalski, Klimek, 2014, p. 144]

2.5.2. Investment process

Due to the research topic, primarily those elements of the process that refer to the area of geodesy and cartography received most attention. The concept of the adjusted course of the investment process is presented in Fig. 10.

In addition to making the process of ownership rights transfer more effective (as described above), one should eliminate the participation of the geodetic and cartographic administration in the investment process during its subsequent stages. Developing maps for design purposes, specifications and post-construction surveying should be performed by qualified surveyors[10] (geodetic companies) employed by the investor (or by the designer or construction manager).

An investor who is the manager of utilities networks (sensitive structures due to state security) should be assigned the obligation to collect information on the location of the networks and to provide information to

[10] Surveyors gather their own resources of documentation (which could be saleable).

entities in this respect. The utilities network manager should be fully liable for the consequences of providing erroneous information.

Having granted the building occupancy permit, the district inspector of construction supervision should provide information about the location of the building to the cadastre office, which will place the building contours on the cadastral map.

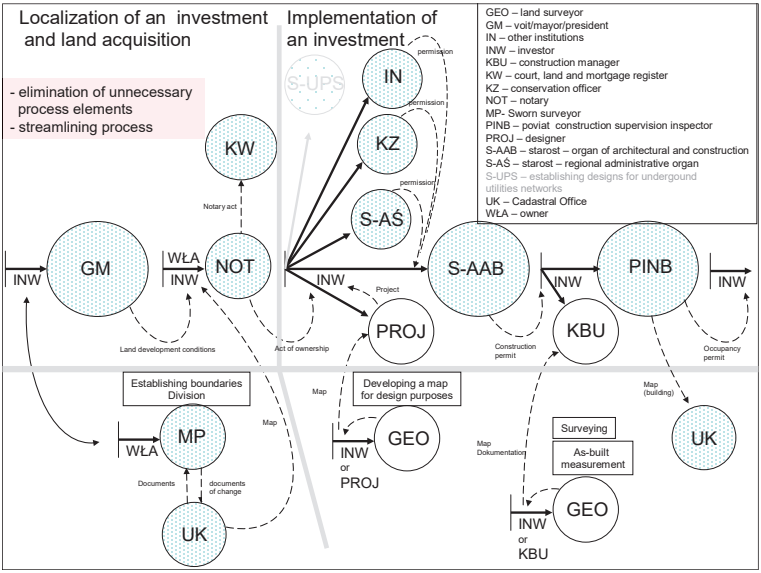

Fig. 12-10. Adjusted investment process
Source: based on [Nogalski, Klimek, 2016, p. 353]

2.6. General description of organisational solutions in other states

When work on the concept of the organisation responsible for the cadastre commenced, the fact that many tasks of country surveying are very important for the state functioning and should thus be implemented by the state administration was taken into account. Attention was given to institutional solutions in those EU states that have hierarchical governmental cadastre institutions, closely cooperating with the institutions responsible for ownership rights, where ownership boundaries are set by a properly authorised surveyor. Research was performed with respect to obtaining answers to the questions in Fig. 12-11.

A general organisational description of the institution of cadastre in the six states located in the vicinity of Poland shows significant organisational variation when it comes to the institution in question[11].

If we start with the location within the structure of state administration, except in the case of Lithuania, this has to do with organisational units of public administration that are the so-called "primary" or "central" offices. When we determine the place of such units (bodies) in the state administration by locating their heads in such a formal instrument, we observe different configurations. In the Czech Republic and Slovakia, it is a member of the government, i.e. a person holding the rank of minister. In Germany, the authorities responsible for cadastre are part of the governments of individual states – here, however, actions have been taken to coordinate activities by creating an institution at the federal level assigned to a permanent conference of ministers of the interior. In Austria, the central authority is subordinated to the Minister of Economy and Labour. In Sweden, the Ministry of the Environment is the supervisor. In Lithuania, it is the head of a company with limited civil liability, supervised by the Minister of Justice.

[11] Developed on the basis of [PCC]

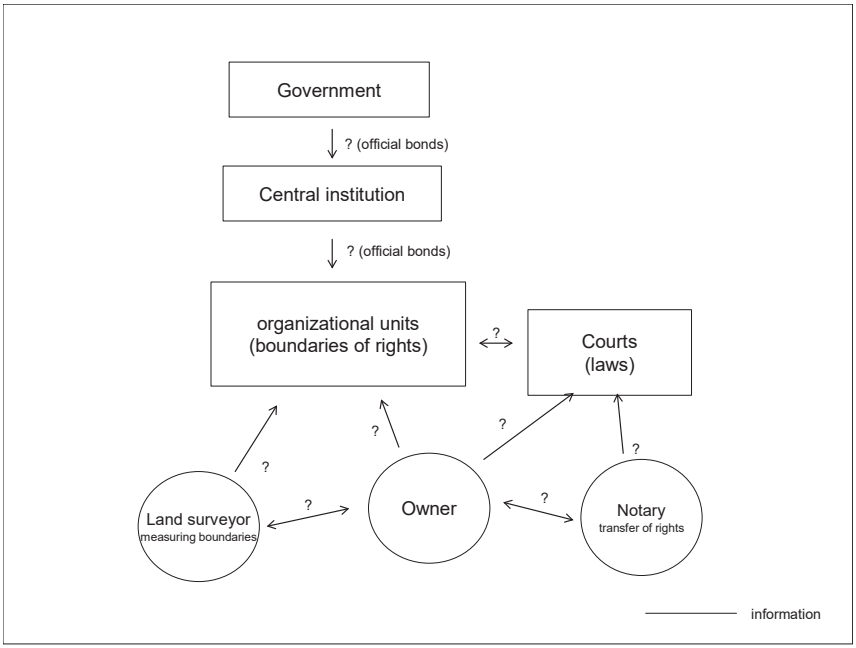

Fig. 12-11. Structures in other countries – research
Source: based on [Nogalski, Klimek, 2014, p. 133]

In addition to the cadastre, the institutions in question implement other tasks in the area of country surveying and collecting spatial information of various scopes.

In all analysed states, organisational units that maintain registers of cadastre data, subordinated to the central institution, are in place. No subordination (only supervision or control) occurs in several cases in Germany and in Sweden, where local governments have adequate competences.

Registration of land rights takes place directly in the units maintaining the cadastre (Czech Republic, Slovakia, Lithuania, Sweden), or as a consequence of an entry of rights in courts (Germany, Austria).

In practical terms, in all states, the entries in the cadastre are made on the basis of documentation prepared by licenced surveyors, developed without the participation of local administration.

Unlike in the countries listed above, Poland has no properly organised administration.

2.7 The concept of institutional changes

In our work, we placed particular emphasis on the criteria of improving the system of ownership rights' protection, boosting the efficiency of investment implementation, improving the efficiency of other public administration sectors, targeting customer needs, and taking into account the principle of subsidiarity.

Recognising the need to protect the boundaries of ownership rights as something obvious, the focus was on the investment process and its improvement. In doing so, the investor was placed in the context of institutions supporting his actions (Fig. 12-12).

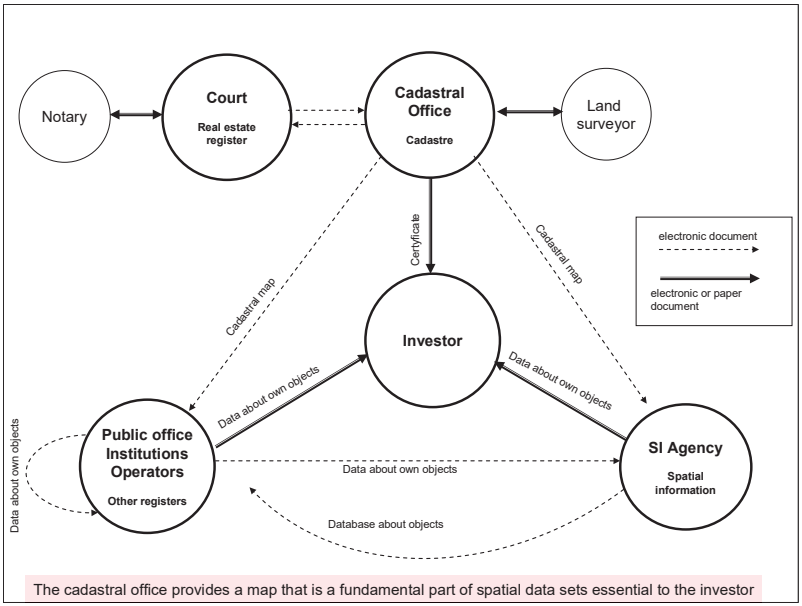

Fig. 12-12. The concept of the support system for an investor – configuration of institutions and flow of information
Source: based on [Nogalski, Klimek, 2014, p. 150]

Offices, institutions and other entities collect and share information about objects and phenomena located in space. A high-quality cadastral map, made available in particular to the entities registering spatial objects and phenomena, is a fundamental instrument for harmonising all types of spatial data necessary for the investor (but also for other institutions and entities).

The techniques of information flow used today (computer networks, the Internet) facilitate its ubiquitous flow and access to data collected in any place. It is only a matter of time before all the registers and sets of documents will be digitalised across all institutions, organisational units, and economic entities. This should have a significant impact on the way the institutions and other entities are configured in the system of collecting and processing spatial information. Each entity (administrative or commercial) maintaining its register may share it with (sell it to) any other entity. What is crucial is that harmonisation of such data is guaranteed – this role is planned for the concept of cadastral maps used as a sort of "reference system".

The task of the state should comprise the creation of conditions for maintaining information flows between institutions and entities such that they could promptly collect information necessary to implement particular tasks, especially those resulting from EU laws. The concept provides for the formation of a specialised institution (e.g. Governmental Agency of[12] Spatial Information), which would deal with the collection (purchasing) and sharing (sale) of spatial data, in the form of state economic tasks, with those entities that could not collect such information themselves.

Such solutions ensure interoperability and the harmonisation of spatial data sets and services which are necessary to meet the objectives of the EU Directive 2007/2/EC (Infrastructure for Spatial Information in the EU).

The use of IT tools will enable a quick response to customers' specific demands (particularly investors) for information, instead of the current obligation to acquire (for a fee) information that is unnecessary, or necessary but unreliable, which is now collected from the office.

2.7.1. Scope of administration tasks

From the concept of processes, the scope of public administration tasks emerges in the area of geodesy and cartography: the administration concentrates on maintaining the cadastre, which is an element of the system of ownership rights' protection in the scope of their territorial range. Many other currently performed tasks should be handed over to competent entities. In particular, keeping the records of buildings and records of premises should be handed over to other state administrative bodies (construction supervision, architectural and construction

[12] In the legal sense, a "government agency" means an institution established by law, in the form of a state legal entity, to perform economic tasks of the state, within the scope of its powers and authorisations granted [Niczyporuk, 2002, p. 164]

administration); and keeping the records of the networks of utilities should be handed over to the managers (owners) of these networks. Moreover, the registration of terrain details and maintenance of the master map should be abandoned. In addition to keeping maps and cadastral records, government administration should carry out such tasks as the maintenance of geodetic control networks (networks of points enabling surveying to be done in a single reference system), recording administrative boundaries, setting standards for maintaining maps, coordinating development work on topographic maps, orthophotomaps and any studies required by the state institutions to protect the country against threats.

The mission and the primary objective for the cadastral administration was determined based on the assumption that Poland is in need of a legal order of lands, since having one would significantly improve investment processes and boost GDP. Moreover, Poland would meet the obligation of state protection of ownership rights.

It was assumed that the mission of cadastral administration is to maintain the legal order of land in the state. Maintaining up-to-date, fully reliable registers and cadastral maps reflecting the state of the law on the ground are seen as the main objective.

In view of the above, the following basic tasks for cadastral administration were established:

- maintaining a cadastre (records and maps), in particular registration of plots, boundaries, and boundary points[13], as well as registration of buildings and (only) the location thereof,
- sharing of cadastral data, in particular maps reflecting the location (boundaries) of plots, the course of property boundaries, location of buildings,
- issuing certificates from the cadastre,
- sharing data required to recreate boundaries,
- standardisation, in particular in the area of cadastral surveying, registration and access to cadastral data,
- oversight over the work carried out by sworn surveyors,
- in special cases – performance of surveying work,
- actions to raise the legal awareness of society as regards the protection of the boundaries of ownership rights.

[13] In the option of institutional integration – also registrations of rights

The currently maintained registers and maps have a number of defects; therefore, a transitory period is needed, during which the following tasks should be completed:

- selection of accumulated information (after defining the information range of the cadastre),
- verification of selected information (entering warnings for uncertain data)
- assigning the attributes of a public register to data sets.

During this period, entries are verified by the officials as they handle specific cases; such verification includes the examination of land and mortgage registers and their files, the examination of land registers and cadastral maps as well as of documentation of the state geodetic and cartographic resources (hereinafter referred to as resources), the removal of detected defects or their disclosure, making an entry in the cadastre (by way of a decision) and notification of the owner, and - in the case of obsolete content of Section 1 of the land and mortgage register – preparing documentation to correct the entries in the register and petitioning the court to correct the entry.

The body which maintains the cadastre must have complete evidence documentation on the course of boundaries. Therefore, it is necessary to take over the subdivision and delimitation documentation gathered by the municipalities.

Taking the significant value of geodetic and cartographic documentation into account, it should be entered into the computer system as quickly as possible. This will improve the verification of information and guarantee many entities equal access to the documentation, especially those that will have to use it as a result of institutional changes.

2.7.2 The concept of structure

In light of constitutional provisions on equality before the law [Constitution, Art. 32] and the obligation to protect ownership rights [Constitution, Art. 21], focus should be placed on the unification of task performance by cadastral administration across the country. Bearing in mind the institutional solutions in the EU states, it was considered crucial to create a sector responsible for maintaining the cadastre, but also for implementing certain geodetic and cartographic tasks, within governmental administration.

The analysis of the structure-forming factors [Nogalski, Klimek, 2014, pp. 153-154] justifies the feasibility of setting up cadastral administration with the characteristics of non-integrated administration. The dimensions of the proposed structure are presented in table 12-2.

Table 12-2. Dimensions of cadastral administration structure

Dimension	Description
Configuration	– two hierarchical levels, – level 1 - management range: close to the number of regional offices (6-8) – level 2 - management range (10-15): resulting from the number of sub-regional offices (approx. 80)
Specialisations	– level 1 – coordination of the actions of cadastral administration, development of standards and norms, maintenance of the register of administrative borders of the state and provinces, interdepartmental cooperation, international cooperation, research and development of the maintenance system of the legal order of land, organisation of training, computerisation, and tasks related to surveying the country, – level 2 – coordination of actions performed by the basic-level units, implementation and enforcement of standards and norms, identification of existing problems, keeping records of the administrative borders of districts and municipalities, cooperation with the district court, cooperation with other governmental bodies and local provincial governments, coordinating the implementation of new legal solutions, organisational and IT tasks, as well as certain tasks in the field of surveying the country – level 3 - keeping the cadastre, issuing certificates, sharing data, keeping a collection of cadastral files, checking work performance (also in the field), and in exceptional cases – surveying
Standardisation	– high – standardisation of procedures, high-level repetitiveness and routine of actions, large number of technical standards.
Centralisation	– level 1 – decisions on setting standards, procedural and technical norms, human resources decisions related to managements of organisational units, distribution of funds (budgets of organisational units), interinstitutional cooperation (interdepartmental arrangements). – level 2 – decisions on the implementation of standards and norms, post-control requests, human resources requests

	(with respect to managers of lower-level organisational units), – level 3 – other decisions, especially those related to the organisation of office work.
Formalisation	– high – a large number of standards of conduct (laws and regulations, guidelines, regulations) and regulated ways and means of intra-organisation communication.

Source: [Nogalski, Klimek, 2014, p. 154]

The concept of structure is presented in Fig. 12-13.

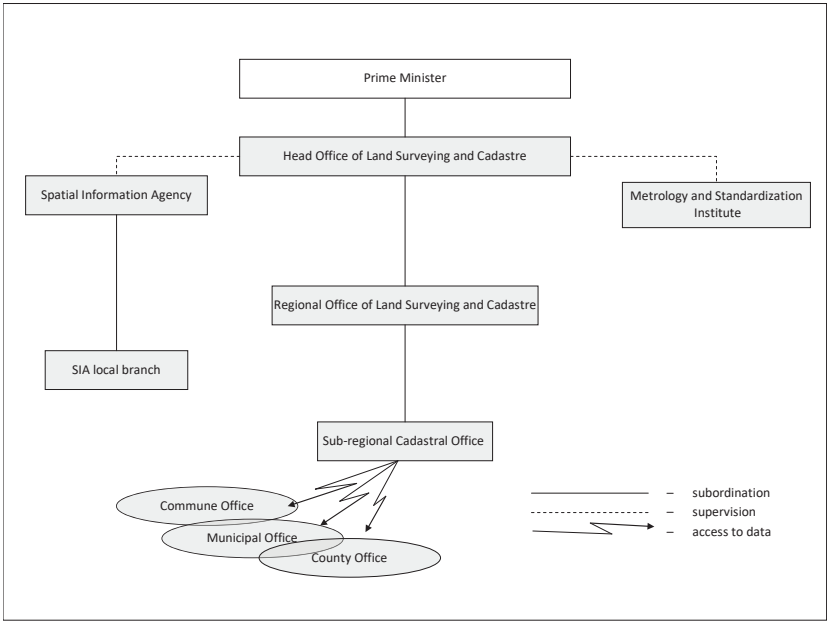

Fig. 12-13. The structure of a segment of administration
Source: based on [Nogalski, Klimek, 2014, p. 133]

The main body of this administration segment would be placed at the level of a member of the Council of Ministers (due to the prevalence of the institution of cadastre). It would then be able to ensure its proper functioning by using the metrology and standardisation institute, i.e. a unit devoted to broadly understood standardisation, grouping theoreticians and practitioners in the science of surveying and creating maps, who develop standards in this area. It should also supervise the Spatial Information

Agency, i.e. an organisation which gathers and distributes (sells and purchases) spatial information (in the form of an economic task of the state), which acts in the area determined in the regulations on the spatial information infrastructure.

2.7.3. Sworn surveyor

An indispensable element of this concept is the institution of a sworn surveyor, an important participant in the process of ownership rights transfer. The sworn surveyor has the sole right to establish the course of ownership boundaries and plot boundaries.

In the scope of his rights, the sworn surveyor is a person of public trust and enjoys the protection granted to public officials. The actions taken by the sworn surveyor are official in nature. When taking actions, the sworn surveyor must ensure proper protection of the rights and legitimate interests of the parties and others for whom this action may have legal consequences. The competences of the sworn surveyor will cover the current competences of the municipal authorities. The institution of the sworn surveyor will definitely optimise the process of determining boundaries and subdividing lands through the removal of the local government administration from the process.

2.7.4 Managers of the land utility networks and other structures

As part of the concept, the legislator imposes on some entities the obligation to keep records of their own structures. These entities will be obligated to indicate the location of the structures and bear all the consequences of any erroneous indication. They will also be obliged to promptly provide information in response to submitted queries (it is assumed that all the entities which are required to keep the records will do so in electronic form). In particular, such obligations should be imposed on the managers/owners of utilities networks.

The role of the local government body should be reduced to keeping a register of entities that manage the structures in the area supervised by the body, which would enable the electronic sharing of requests for access to data.

2.7.5. Conclusion

Cadastral administration, gathering and providing reliable information on land rights and boundaries of property rights, as well as the sworn

surveyor - as an official who efficiently and honestly defines the limits of the law - acting hand-in-hand with land and mortgage register courts and notaries, will create a system of maintaining the legal order of land.

The Institute of Metrology and Standardisation, made up of theoreticians and practitioners in the field of surveying and mapping science, will deal with broadly defined standardisation in this field.

The Spatial Information Agency will implement tasks related to spatial information infrastructure, collecting, processing and releasing (for a fee or free of charge) information obtained through IT tools from public administration bodies, utilities network managers and any other spatial data collectors referred to in the EU Directive establishing the infrastructure for spatial information.

2.8. Introduction of changes

The preparation of changes – development of specific organisational solutions, drafts of legal acts – and implementation of these changes should be handled by a Government Representative. He or she should be equipped with instruments enabling the implementation of these tasks and authority over regional implementation teams.

Preliminary work should comprise:

- research with respect to institutional changes in the following countries: Slovakia, Czech Republic, Austria, and Germany.
- digitalisation of resource documentation and handing over paper documentation (except for “cadastre” documentation) to the state archive,
- recreation of detailed geodetic control networks used in boundary surveying and harmonisation thereof with the current system of spatial reference,
- transfer (to the extent appropriate) of digitalised documentation to utilities network providers,
- providing geodetic work contractors with access to digitalised documentation.

After reviewing the institutional solutions in other states, before starting legislative work, the following steps should be taken:

- the choice of either a one- or two-institutional variant,
- designing the most important processes involving the public administration,

- designing organisational structures,
- conducting an analysis of legal provisions and determining the impact of changes on the processes regulated by these laws.

3. Summary

Whilst presenting the results of work carried out in line with the "By Process To Structure" method, we show the potential for its practical application. Using this method will make it possible to find an answer to the question: to what extent, in regard to the tasks the state has today (in the example presented – in geodesy and cartography), should administration act and how should it be organised?

The method enables one to find out how to refocus the actions of administration onto customers, and how to provide the business entities with the necessary data collected by the competent administration bodies or specialised business entities. The method makes it possible to use the principle of subsidiarity, in this case by transferring a series of administrative actions to the competent entities. It allows them to determine their liability. It also indicates how information should flow between the state institutions.

The applied method allows one – already at the concept level – to hold productive discussions on institutional changes (understanding the processes in which state institutions are located provides decision makers, who are generally professional politicians, with the ability to make informed decisions).

We believe that the method sufficiently points to the necessity of preceding legislative work with development work on organisational projects that would determine the place and role of institutions in state processes.

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