Management of Information in the Age of Digital Transformation

The Private and Public Sectors

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MANAGEMENT OF INFORMATION IN AGE OF DIGITAL TRANSFORMATION. THE PUBLIC SECTOR

■ Preface ■

This monograph encompasses aspects of information management in the era of digital transformation relating to both the private and public sectors. This collection of articles delves into issues such as the optimization of existing business processes vis-à-vis their digitization; the increasing of employee productivity through the adaptation of modern IT solutions; as well as the launching of digital distribution channels and the provision of access to services.

The concept of digital transformation is also often understood as the creation of new business processes, from which we have revenue streams, process automation and the amelioration of managerial abilities; including the internal flow of information in an enterprise or in sales management processes. Digital transformation also brings about a change in the management culture of an organization. Another aspect of digital transformation is the use of gigantic data sets by enterprises and institutions.

This monograph presents key issues related to the use of large data sets by enterprises in the realm of socially responsible activities in the modern economy. To this end, the possibilities, limitations and dilemmas associated with the use of Big Data by modern enterprises are explored.

Addressed also in this monograph are the positive and negative consequences of the use of information and communication technologies (ICT), in particular with regard to Big Data. The authors show the benefits, but also draw our attention to the limitations of Big Data in modern enterprises. They also point to selected threats arising from the complexity of the process of shaping modern technological solutions; and also to their impact on both the functioning of enterprises in the modern economy and the course of socio-cultural changes taking place in our contemporary world.

An important topic broached in this monograph is the involvement of institutions and enterprises in the identification of mechanisms related to ensuring data security, the protection of the privacy of individuals, as well as

the legal and ethical protection of practices related to the use of data by enterprises.

Individual chapters are devoted to strategy and marketing, as well as to specific promotional tools available in a modern enterprise, particularly with regard to information management in the era of digital transformation.

This monograph foregrounds not only the possibilities but also the threats resulting from the progress of civilization; because in the era of digital transformation, information threats are also gaining in prominence. Today, threats to the security of information data are of key importance for the security of both states and societies. A great challenge is also posed by the counteracting of threats to information data security so as to avoid the destabilization of information and ICT systems.

Jolanta Brodowska-Szewczuk

PART 1

MANAGEMENT OF INFORMATION IN THE AGE OF DIGITAL TRANSFORMATION

THE PRIVATE SECTOR

■ Chapter 1 ■

Corporate Social Responsibility and the use of Big Data

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Abstract: The aim of this article is to present the key issues related to the use of Big Data sets by enterprises pertaining to socially responsible activities in the modern-day economy. Here the attention is paid to the characteristics of Big Data sets, their importance in the operation of a given enterprise and on showing the possibilities, limitations and dilemmas related to the use of Big Data with regard to Corporate Social Responsibility. The analyses presented is based on domestic and foreign literature and the reports of analytical and consulting companies, with a focus on the positive and negative consequences of the use of information and communication technologies (ICTs), in particular Big Data. Indicated are the selected benefits and limitations of Big Data in the operation of modern enterprises. Referred to also are the selected threats resulting from the complexity of the process of shaping modern technological solutions and their impact both on the functioning of enterprises in the modern economy and the course of socio-cultural changes in the world. An important issue addressed in this article is its indication of the appropriate involvement of enterprises in the identification of mechanisms related to data security, the protection of individuals' privacy, as well as the legal and ethical protection of practices related to the use of data by enterprises.
Keywords: Big Data, ITC, Social Responsibility, New Economy

Introduction

Globalisation and technological progress, stimulated by the emergence of ever faster computing machines and the development of the Internet, have led to the expansion of information and communication technologies (ICTs) in almost all spheres of life. The economy of the 21st century is dominated by

numerous digital technologies whose functioning relies on the rapid transfer and processing of large amounts of information in real time from multiple sources. Large data sets (Big Data), whose socially responsible use on the part of enterprises remains a relevant and significant topic in modern public discourse, are of particular importance when it comes to ICTs. The aim of this article is to present the key issues related to the use of Big Data by enterprises pertaining to socially responsible activities in the modern economy. Here attention is focused on the characteristics of Big Data and the presentation of the possibilities and limitations resulting from the use of Big Data in the operational running of enterprises. The analyses presented in this article are based on domestic and foreign literature and reports of analytical and consulting companies.

Materials

The modern economy, called the "New Economy", is based on modern information and communication technologies, which make it possible to collect, process and transmit large amounts of data in an ever shorter time. Since the beginning of the digital revolution, the phenomenon of faster and faster transfer of information between different entities, creating a socio-economic space, has been observed. The dynamic growth of data has brought about the creation of extremely capacious volumes called "Big Data" which means "large data sets".

The term Big Data was first used by NASA researchers M. Cox and D. Ellsworth in 1997, who paid attention to the problem of Big Data Collections and Big Data Objects which, according to the authors, were too large to be processed using standard algorithms and software on a single computer (Cox et al. 1997). The Gartner analytics and consulting company defined Big Data as "high volume, velocity and/or a variety of information assets that demand new, innovative forms of processing for enhanced decision making, business insights or process optimization" [https://www.gartner.com/it-glossary/big-data]. In 2001, Gartner's analyst created the 3V model describing three main Big Data attributes (Laney, 2001). Volume, indicating the amount of data, Velocity informing about the speed of data generation and processing; and Variety, describing the diversity of data. The IBM IT company, based on the 3V model, made a deeper characterisation of the basic

attributes of large data sets by dividing them into three dimensions (http://www-01.ibm.com/software/in/data/bigdata):

- Volume – an observable dynamic growth of data whose capacity is calculated in petabytes (PB). According to information published by IBM, 2.5 trillion bytes of data from various sources are generated every day around the world, including sensors used to collect buyer information, social media posts, digital photos, videos, purchase transactions, GPS signals from mobile phones [https://www.ibm.com/blogs/insights-on-business/consumer-products].
- Velocity – refers to the speed of data analysis and its inflow. At high speeds of the stream inflow of digital data, the ability to select data from the point of view of its informative value becomes extremely important.
- Variety – refers to various types of data: structural, semi-structural and unstructured (the so-called Dark Data), for which the use of typical methods of their processing and storage becomes insufficient.

Within a few years after the presentation of the "3V" model, further Big Data attributes such as Veracity and Value were added, creating the "5V" model (Michel, 2018). Big Data is a term used for data sets that are simultaneously characterized by large volume, diversity, real-time stream flow, variability, complexity, and require the use of innovative technologies, tools and IT methods to extract new and useful knowledge from them (Tabakow et al. 2014, p. 141).

The literature review allows us to state that the term Big Data refers to the process of collecting, storing and processing large data sets which require the use of technological tools and solutions for their analysis, taking into account their dynamic growth and structure.

Big Data's composition is characterised by a great variety of sources of their origin, most of which are not correlated with each other. When characterising data in enterprises, two main sources of origin can be identified: internal and external.

Data from internal sources, usually presented as structural, are mainly derived from relational databases such as: financial and accounting system, CRM solutions and transaction systems used in a given organisation (Filip, 2015, p. 43). Structural data are classified as organised, which, in the case of their specific structure, facilitates their processing in a timely fashion.

Data from external sources are referred to as semi-structural or unstructured, and are characterised by an irregular structure. This group includes various types of documents in text form (text files, scans of documents, e-mail content), multimedia, sensory and geolocation data, and from Internet sources (social networking sites, discussion forums, online stores) (Filip, 2015). According to experts, semi-structural and unstructured data constitute up to 85% of all data available on the Internet [https://www.computerworld.pl/news/Goniac-za-nieuchwytna-informacja-w-sieci].

Big Data does not only refer to large volumes of data stored on the server but also to the efficient processing of data sets from various sources. From the perspective of enterprises, Big Data covers a wide range of topics from storage and processing activities to data visualisation (Weinert, 2015, p. 14).

The enterprise's ability to access and analyse Big Data is considered the attribute of a modern enterprise. It is noteworthy that an enterprise's analytical capacity to process information from large datasets represents a competitive factor. Data is a specific resource that enables enterprises to grow, increase their productivity, and satisfy the needs of a wide range of stakeholders. According to P. Płoszajski, the processing of Big Data creates value for enterprises by (Płoszajski, 2013):

- making information transparent and accessible at a higher frequency,
- creating and storing more information on transactions in digital form for better performance measurement,
- creating more precise customer niches and better tailored products and services,
- supporting the development of the next generations of products and services,
- conducting controlled experiments.

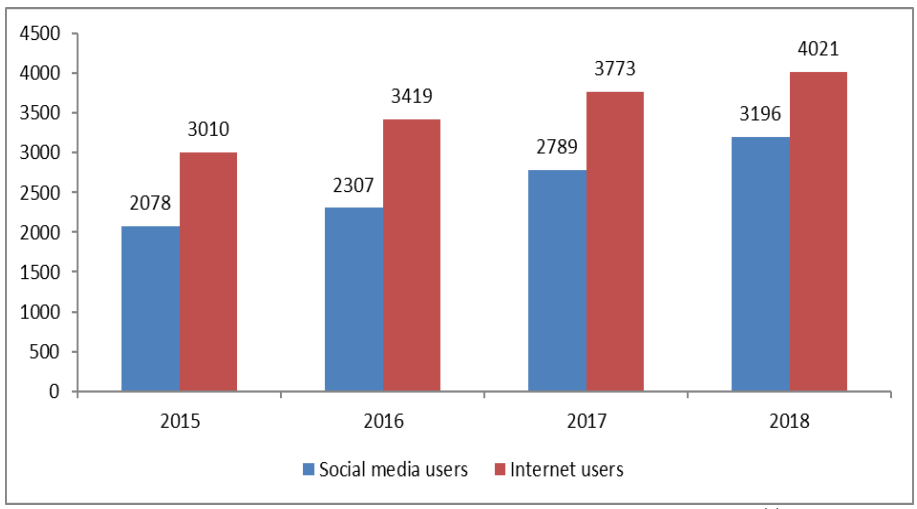
For many years user activity has been responsible for the process of generating data in the global information network. Smart devices connected to the network create and will generate most of the information on the Internet. Graph 1 shows the growth of the number of Internet and social media users globally in 2015-2018 (as of January each year).

According to the information presented in Graph 1, a dynamic, annual growth of Internet and social media users can be observed. This phenomenon is facilitated by the development of telecommunications infrastructure and the

availability of equipment enabling active use of the Internet. The information presented in Graph 1 shows that the growing number of network users will be the source of subsequent information streams created by the current and new Internet and social media users that can be used by enterprises.

The possibilities offered by Big Data are almost limitless. Development and use of modern technologies of data collection, processing, transfer and analysis are applied in such sectors of the economy as industry, banking, telecommunications, insurance, tourism, health care, public administration, power industry, transport, construction and science.

Graph 1. Global number of Internet and social media users in the years 2015-2018 in million



Source: Own calculations based on [https://wearesocial.com]

Discussion

Along with the development of digital technologies, the way the new technological solutions influence the social and economic sphere has changed. Big Data and its dynamic development raises a number of new, unexplored issues concerning the management of big data sets and their social consequences.

Big Data with the intensive development of ICT technology has enabled the acquisition, archiving, transfer and analysis of data and become an integral part of the enterprise management system. A key role in the process of enterprise management is played by data analytics, thanks to which it is

possible to discover new, unknown relationships among data and phenomena useful in cognitive, research and decision-making processes (Jurczyk-Bunkowska et al. 2017, p. 96-97). The knowledge gained in the process of data analysis can be used in business activity as well as in the publicsphere. Data analysis is used in such areas as: health care, environmental protection, public safety, banking and finance, production, trade, services, transport. According to a report by the IDC consulting firm, the global market for business analytics and Big Data is growing at a double-digit rate every year and should reach USD 210 billion by 2020. IDC analysts indicate that the largest customers of Big Data technology in the next few years will include the banking and industrial sectors, which confirms the value and number of realized and planned investments in these sectors (https://www.idc.com).

The development of Big Data technology has also contributed to the development of predictive analytics, which anticipate the behaviour of specific market entities (e.g. customers) and entire sectors of the economy on the basis of historical data analysis. Predictive analytics in the area of consumer behaviour is currently an extremely popular topic. Analysing the history of customer purchases and the information provided by customers through a variety of information channels (e.g. social media) allows enterprises not only to create a competitive offer but also to anticipate their future needs before they arise (Mróz, 2017, p. 145-146). The creation of added value for customers is now possible through the integration of digital technologies with expert knowledge of customer requirements, continuously modified by available data analyses provided by Internet of Things (IoT) technologies and supported by artificial intelligence (AI) (Nowak et al. 2018, p. 67). Apart from supporting strictly marketing activities, predictive analytics is also used in many other spheres of everyday life. It is applied in socially responsible projects devoted, among other things, to the development of specific diseases among the population, the possibility of natural disasters, climate change and many other predictable issues.

One of the problems with Big Data is the quality of data coming from many different sources, relating to their reliability and precision. It is reasonable to seek ever more perfect ways of separating valuable from information from useless information in the shortest possible time. Advances in computational technology offer new opportunities to use statistical methods in order to explore the relationships among variables, determine the

probability of their occurrence and to eliminate statistical errors (Kosior, 2016, p. 99-100).

The challenge for the future in the context of the development of Big Data will be to effectively manage expanding digital data streams. Enterprises with limited capacity in terms of using their own computing capacities will increasingly use data analytics in the form of external services, such as Cloud computing). and data storage,, which, according to Gartner, an analytic and advisory company, are defined as a transformation of the existing business model based on stationary solutions into the so-called "cloud shift", which can be described as a shift of enterprises (https://www.erp-view.pl/business intelligence).

The possibilities of using Big Data in the modern economy are extremely wide, bringing a together an amalgamation of benefits in economic, socio-cultural and environmental terms; but the dissemination of information technologies supporting the management of large data sets also reveals a number of problems which have arisen at the interface between the functioning of society and digital technologies. Large data sets and their misuse have contributed to socially irresponsible behaviour.

Sets of data as a valuable resource can be temptation for any organization. The analysis of the behaviour of individuals or entire social groups on the basis of digital records of their activities can be used against them in projects the participants have not onlynot given consent, but have also no knowledge about their purpose, course and effects of such analysis. The exchange and fee-based sharing of customer personal data (often sensitive) by enterprises to other market participants are always controversial, and in terms of social responsibility, such practices can be described as unethical; and often illegal. An example of such actions is the situation in which Facebook users found themselves in March 2018. Users received a signal that the information they had posted on Facebook had been used for purposes for which they had not given their consent. Cambridge Analytica, which had access to the Facebook platform, obtained and used data on 50 million users of the portal. Cambridge Analytica's data analysis was used for political purposes such as predicting and influencing the election decisions of Facebook users in the U.S. [https://www.spidersweb.pl/2018/03/facebook-cambridge-analytica]. The situation proved to be the starting point for a broad and lively debate on information security on the Internet, and on the importance to counteract the

use of data by different market players without the knowledge and awareness of social networking users.

Another example of the risk associated with large data sets is is the challenge of protecting them against theft. In 2018, 1000 GB of data per second was produced worldwide [https://ubezpieczenia-cyber.pl/statystyki-atakow-wycieki-danych]. Such a large amount of information appearing in such a short period of time represents a challenge not only for information storage security, but above all for the protection of infrastructure:its transfer and processing. The development of effective data protection systems and preventing data from falling into the hands of third parties should be a priority. According to the Check Point report, 2017 was an exceptional year in terms of the number and specificity of hacker attacks. According to specialists, every day hackers attack companies around the world more than 6.5 million times. Poland, ranked 7th in Europe in terms of network security, was a frequent target of cybercrime attacks in 2017 (http://businessjournal.pl/raport-check-point-software-technologies-polska-celowniku). Experts dealing with the issues of network security emphasise that the blame for hacker attacks can be attributed to imperfect IT security systems, but also to the human factor, which is often manifested by a lack of awareness concerning the threats associated with cyber attacks; and also a lack of knowledge about the mechanisms behind such attacks.

One of the risks associated with Big Data, and extremely important from the perspective of social responsibility, is the protection of privacy. Data created with the use of electronic devices communicating with each other without human participation (Internet of Things - IoT) may record and transmit, among others, confidential and sensitive information. Different institutions justify individual or group surveillance practices by explaining that it is for reasons of public security, which may not always be true. The supervision of activity together with the use of data collected in this way, without the consent and knowledge of those under observation, is an intrusion on the private sphere, and such activities are often both illegal and ethical. Another problem of Big Data from the legal point of view are the legislative delays in relation to the use of ICT in everyday life. The global nature of the network also raises the issue of the legal protection of IT infrastructure elements, which are often located in different countries and subject to different jurisdictions. This situation makes it all the more necessary for legislators to regulate of provisions with respect of of their social perception and impact.

Conclusions

Information and communication technologies (ICT) have become an essential part of everyday life and their increasing use has fundamentally changed the functioning not only of enterprises and institutions but also, and above all, of society as a whole. Continuous and intensified data generation is a major challenge for enterprises, who must use such data in a socially responsible way. Ignorance of the long-term effects of digital technological solutions should be an impulse for the conducting of research on the impact of ICT on various spheres of human life, and its socially responsible application. The effect of this socially important discourse would be to show the complexities associated with absorbing modern information and communication technologies into business practices. It will also be important to pursue andan impact assessment on the course of economic and socio-cultural changes. The context of the use of information contained in Big Data, which is incompatible with binding legal and ethical principles, should constitute a starting point for actions aimed at the effective elimination of such practices among enterprises and public institutions, as well as the active prevention of their occurrence. Legislative actions must keep pace with technological changes, the effective protection of personal data and the fight against digital crime. The socially responsible use of ICT moust also be to the fore, with actions addressing both the users and beneficiaries of digital solutions. Only such steps can effectively solve the problems related to the misuse of Big Data.

■ Chapter 2 ■

Creating Value for Stakeholders Through Coopetitive Activity

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Abstract: Value creation has been attracting growing interest among researchers due to its key role in building competitive advantage. According to the most influential trends in management and organization theory that have emerged in recent decades, value can also be created as a result of seemingly paradoxical coopetitive activities. The aim of this study was to identify the values that are co-created through coopetitive activities with the involvement of stakeholders. The results of the analysis revealed that coopetition contributes to the creation of three types of values: economic value, knowledge, and social and environmental value. Value creation is determined mainly by economic and social factors. This article is informed by theoretical issues, and the proposed model can be applied in empirical research.
Keywords: coopetition, value, stakeholder, value creation

Introduction

The complexity of the business environment and the challenges associated with building and constantly maximizing a company's competitive advantage have prompted businesses to enter into previously unencountered relationships. Coopetition, which is a portmanteau term combining cooperation and competition, is one of such relationships. According to Brandenburger and Nalebuff (1996), coopetition is a process of baking a larger cake through cooperation and sharing that cake through competition. Therefore, coopetition involves both value creation (cooperation) and value appropriation (competition). The creation of shared value in coopetative relationships is justified by coopetition, a seemingly paradoxical concept that

emerged in management theory in the 20th century; as well as by relationship and network theories, rooted in the resource management approach.

Value creation is one of the key concepts in strategic management and economics. It is of paramount significance for companies, for competitors who have entered into a coopetitive relationship with a company, and for all stakeholders in the supply chain and the value network. In management science, value is analyzed at three levels. Firstly, the main focus is put on value creation only; secondly, the emphasis is placed on value appropriation; and thirdly, both processes are taken into account. However, in the existing research, value creation is rarely analyzed jointly with stakeholders, and even if such attempts are made, stakeholders are not sufficiently characterized (Garcia-Castro 2015). For this reason, the aim of this study was to identify the types of value that are co-created as a result of coopetitive activities that involve stakeholders. Based on the first approach, attempts will be made to answer the following questions:

1. What types of value can be created through coopetition?
2. What are the determinants of different types of value?
3. Who are the stakeholders in the process of value creation through coopetition?

The answers to the above questions will support the development of a theoretical model of value creation through coopetition. The theoretical model will be then verified empirically to determine which types of value play a key role (are rudimentary) for different stakeholder groups in a coopetitive relationship.

Method

The article discusses theoretical issues, and the results can be applied in empirical research. In the article used method of systematic review literature. The following databases were selected for the study: Ebsco and Google Scholar. In each of them used search keywords: coopetition, value creation and stakeholders.

Definition of Value

Value is a concept with multiple meanings. According to the *Dictionary of the Polish Language*, value is a concept that refers to objects, people, ideas and

physical units. Value can represent the material or monetary worth of an object. It can also denote personal significance (in terms of human characteristics) and a sense of self-worth, as well as the importance of an object based on its ability to satisfy human needs. Value can also represent the creation of new worth or utility. The last meaning of value refers to a number defining the amount of units used in measuring physical quantities. The presented approach not only has multiple meanings, but it also makes broad references to various areas of life and science, including sociology, psychology and economics.

The first attempts to define value were made already in antiquity by Aristotle who endeavored to determine why some objects have greater value than others. Ultimately, social needs were regarded as the main measure of value. In economics, the nature of value was debated by Adam Smith who postulated two approaches to the problem. The first was based on his notable work, *The Wealth of Nations* (1776), which argued that individuals are fully capable of choosing what is best for them and, therefore, are able to define objects or concepts that they value most. Most importantly, these choices are made autonomously by every individual. The second approach emphasized that in a free market, consumers can choose what they buy, from whom and on what terms. Their actions are driven by the desire to maximize the profit or value derived from a given transaction (Smith, 2012).

In subsequent years, value was also defined as a measure of pleasure and pain, where the former should be maximized, and the latter minimized. The concept of value was also analyzed from the point of view of its utility, where value was attached not only to the production of pleasure and the privation of pain, but was generally associated with happiness and well-being. In this approach, human needs were the ultimate measure of value. This view was postulated by John Stuart Mill who was a proponent of utilitarianism, a philosophical theory claiming that moral action maximizes utility (Mill, 1961). In contemporary economic thought, the concept of value (in particular in the context of utility) was linked with welfare economics and social choice theory. In this approach, the concept of value was combined with various factors or determinants, such as price, labor, exchange or production. The above gave rise to the concept of economic value measured in monetary terms. Economic value makes a reference to exchange value (which is affected by supply and demand), utility (defined individually by every consumer), cost (the sum of material inputs and labor in the process of

manufacturing the final product) and added value (the difference between the value of a produced good and total production inputs). Value can also be defined as the difference between the benefits perceived by a consumer who purchases a given good and the economic costs borne by the producer. The benefits perceived by the consumer can also be replaced with the consumer's propensity to pay (Peteraf, Barney, 2003), whereas costs decrease the final value of the product. This definition of economic value makes a reference to the concept of surplus value which includes the consumer's surplus and the producer's surplus (Brandenburger, Stuart, 1996). Światowiec-Szczepańska (2016) posits that economic value is linked with residual value, defined as the difference between total economic value and the value provided to the customer. The above definition refers to the concept of economic rent (Światowiec-Szczepańska, 2016).

From the point of view of economic rent, businesses have to explore and exploit inter-organizational relationships which are mutually dependent and complementary and, if adequately balanced, improve a company's performance (Stańczyk-Hugiet, 2016). Stańczyk-Hugiet makes a reference to the theory of weak and strong ties that constitute a structural dimension of social capital. The strength of these ties is a product of time (frequency), intensity (number and magnitude), intimacy (mutual trust) and reciprocity (Granovetter, 1973). According to Granovetter, businesses benefit more from weaker inter-organizational ties which are a source of new and more diversified information. Weaker ties also enable a company to more accurately identify changes and opportunities in the business environment. In contrast, Bramel argues that entities bound by stronger ties are characterized by greater similarities in various respects. As a result, the probability of friendship and cooperation increases between entities that have entered into a mutual relationship. Therefore, stronger ties are more likely to further coopetition and value creation. The use of both exploration and exploitation techniques and a company's ability to reconcile the two through organizational ambidexterity are discussed by Zakrzewska-Bielawska, who defines ambidexterity as a strategic skill and cites examples of companies that rely on this approach to resolve strategic management problems (2016).

One of the most popular approaches to defining value is the vertical integration concept proposed by Porter, wherein vertical integration relates to the industry value chain, namely the value created by suppliers, the company and its customers (2006). All participants in the value chain

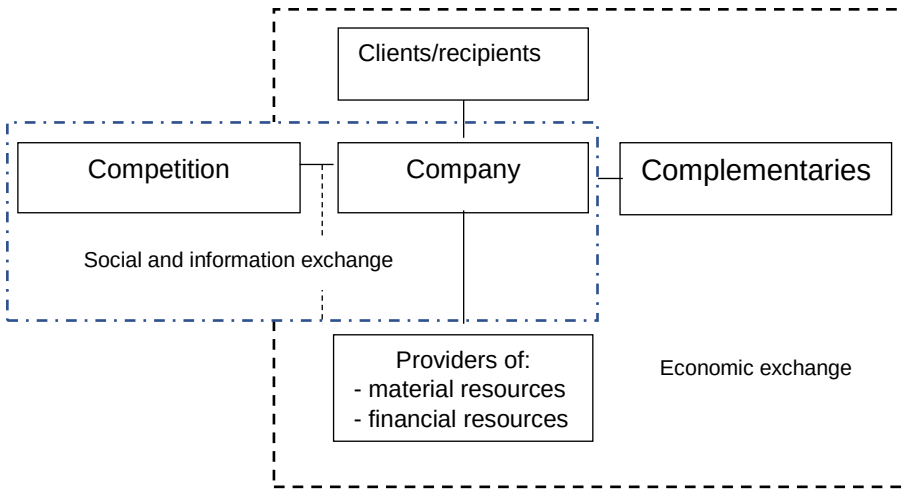
contribute to the creation of value, but they are also hoping to participate in the process of value appropriation.

Porter's vertical integration concept is similar to the value network perspective which is inseparably linked with the coopetition strategy. This concept was developed in reference to game theory where, similarly to vertical integration, the players are represented by customers and suppliers, but also by competitors and complementaries. Complementary businesses make their products more valuable for customers than similar products that are available on the market. In a value network, a company and its competitors are not bound by mutual relationships (they are not involved in economic exchange), but social exchange and the exchange of information taking place in the network (Romaniuk, 2013). Social exchange is based mainly on mutual obligation, trust, involvement and solidarity, provided that all initiatives are voluntary and do not result from altruistic motivations. Social exchange should never involve coercion or sacrifice. Information is one of the most valuable resources, and it should be exchanged with caution and prudence. Information exchange is covered by Game theory and Transaction Cost theory (Romaniuk, 2017). The existence of social exchange and the exchange of information between a company and its competitors implies that competitors participate in value creation as well as value appropriation. Social exchange and the exchange of information in a value network are presented in Figure 1.

In Social Exchange theory, the adoption of a win-win strategy leads to self-empowerment. The partners are willing to accept lower profits in the value creation process to preserve a given relationship (Bengtsson, Kock, 2000).

The value network is rightly referred to as a client-centered approach because it focuses on the client as the ultimate recipient of value, regardless of who creates or controls it. The profits generated by the value network are shared by all network participants. The benefits for suppliers include less uncertainty and resource complementarity. Competitors benefit from the increase in market size and value, whereas the company and the complementaries derive profits from the growth and development of the market (Czakon, 2014). Therefore, the value network supports the generation of relational rents, namely economic rents that are generated jointly in an exchange relationship.

Figure 1. Value creation network with different exchange processes



Source: own study

Coopetition and Types of Value

Coopetition contributes to the creation of value which could not have been generated by an organization in isolation, but which is created by combining the idiosyncratic resources contributed by every partner. Therefore, coopetition is a strategy of gaining competitive advantage and, consequently, creating a coopetitive system of value creation (Dagnino, Padula, 2002). Two types of value can be identified based on the dependencies presented in Figure 1. The first is knowledge, and the second is economic value. Value of knowledge is defined as an increase in inter-organizational knowledge resources which are accumulated through coopetitive actions (Romaniuk, 2017). The accumulation of knowledge requires the exchange of information, which is why knowledge is a less tangible asset than economic value. However, correctly applied knowledge generates economic value (Padula, Dagnino, 2007). For example, a company that acquires an improved production technology from its partner will be able to better meet its clients' needs, increase sales and generate higher profits. In turn, economic value also includes the value generated through coopetition. The resulting value is both tangible and intangible. Tangible value includes an increase in revenues or a decrease in costs, whereas intangible value accounts for joint investments in research, development and staff training, quick agreement on standards,

shorter time to market, joint production, access to the partner's key resources, quick adaptation to market changes, as well as the development of skills, abilities and competencies.

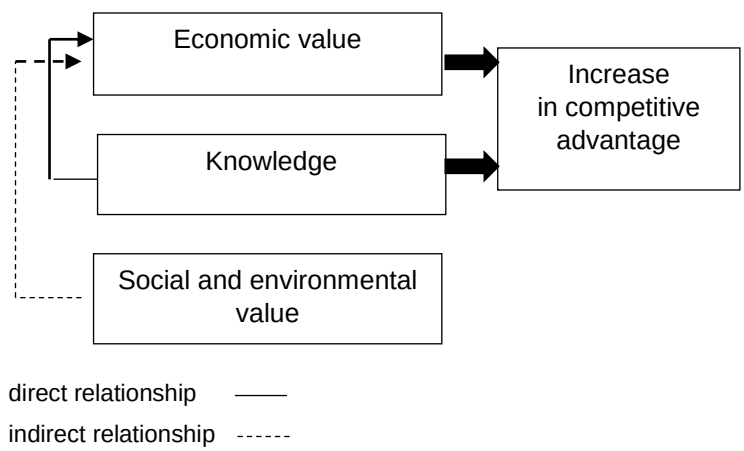
The business environment cannot be disregarded in analyses of coopetitive value creation systems. Every company operates in a turbulent environment. Changes in the business environment drive transformations in a value creation system. A changing environment can influence the worth of the value created in a coopetitive relationship. This could be the case when coopetitors are faced with uncertainty, which prompts them to turn their attention to more competitive or more cooperative activities. Rosenkopf and Tushman demonstrated that both scenarios are possible in response to changes in the business environment (Rosenkopf, Tushman, 1998).

Coopetitors can create social and environmental value as a result of changes in the business environment. This value is comparable, but not limited to the value generated by ecosystem services and total economic value. Total economic value is "the difference between the buyer's propensity to pay and the vendor's alternative costs" (Brandenburger, Stuart, 1996). It is particularly important during value creation as well as during value appropriation. Companies tend to appropriate more value when the prices of products increase or when production costs decrease. In turn, the portion of the value appropriated by the customers increases when their propensity to pay increases or when the price of a product decreases. Suppliers have a greater share of created value when their alternative costs decrease or when company purchasing costs increase.

Social and environmental value includes anthropocentric value as well as internal value, but it does not account for company value which is appropriated through shared and private benefits. The concept of anthropocentric value stems from ecophilosophy which focuses on man's role in nature and the relationship between man and nature. Anthropocentric theories allow for a different degree of compromise between humans and nature. In the first case, the main focus is on man, and the progress of civilization, such as the development of technology, is a value in itself. The value of living organisms that self-reproduce in the natural environment and do not generate costs is disregarded. Therefore, man enjoys a privileged status in nature. A more moderate anthropocentric world view emphasizes the significance of actions aiming to establish an equilibrium in the ecosystem. This condition has to be fulfilled for man's needs and interests to

be fully met. The achievement of an equilibrium state involves a process of establishing boundaries within which humans can explore natural resources while respecting nature (Harrison, Wicks, 2013). The moderate anthropocentric view seems to be far more ethical than its less conciliatory variant. It should also be noted that social and environmental value is a public good in all scenarios, but not all public goods have social and environmental significance, which is why they cannot be appropriated by businesses. Despite the above, businesses can derive certain benefits from social and environmental value, but in a less direct manner. Coopetitors who share logistics operations decrease their fuel consumption and, consequently, carbon dioxide emissions to ambient air. In this case, the public is the main stakeholder, but environmental awareness is one of the key concerns of corporate social responsibility. In practice, companies that create social and environmental value establish better and longer-lasting relationships with external stakeholders that are based on mutual trust, which ameliorates a company's public image. The discussed types of value that are created through coopetition are bound by certain relationships (Fig. 2).

Figure 2. The relationships between the types of value created through coopetition



Source: own study

Economic value indirectly contributes to an increase in a company's competitive advantage. As mentioned earlier, knowledge value, if used appropriately, enhances economic value and, consequently, increases competitive advantage. Knowledge is a basic production asset, and the

exchange of knowledge between coopetitors enables a company to manufacture a new product which enjoys high popularity on the market, thus increasing profits and the company's competitive advantage. Knowledge value can also directly enable a company to gain a competitive edge. The entrepreneurs operating on a given market have to accumulate knowledge about customer satisfaction, and they are chiefly responsible for the value of the offered productions. Therefore, quality management in line with ISO 9001:2000 standards can be a source of competitive advantage. In turn, social and environmental value is indirectly related to economic value. Companies that abide by corporate social responsibility principles derive specific economic benefits, which also enables them to increase their competitive edge.

Stakeholders and the Value They Create

The role of stakeholders in organizational management has been explored by Stakeholder theory which has evolved over the course of the past thirty years. This theory does not offer a clear definition of a stakeholder. Most research in this field makes reference to the work of Edward Freeman who defines stakeholders as "any group or individual who can affect or is affected by the achievement of the organization's objectives" (Freeman, 1984, p. 46). In this study, stakeholders were defined as all groups and individuals who create and appropriate value in their relationships with a given company and are an element of the value network. Based on this definition, the government, which appropriates value through the collection of business taxes, was excluded from the definition of a stakeholder. Society is not an element of the value network, but it benefits from social and environmental value created through coopetition; therefore, it was regarded as a stakeholder. The classification criteria are stakeholder participation in value creation and the derived benefits (Table 1).

The benefits derived by stakeholders from the three types of value created through coopetition, i.e. economic value, knowledge and social and environmental value, are listed in Table 1. The potential benefits of coopetition should be analyzed in view of Stakeholder theory. As regards social and environmental value, Stakeholder theory acts as a bridge between a company's strategy and ethical considerations (Harrison, Wicks, 2013).

Business strategies that show respect for the natural environment and prevent excessive exploitation of natural resources are undoubtedly displays

of ethical practices that safeguard the interests of future generations. Businesses that abide by ethical principles derive intangible benefits which, when appropriately deployed, will generate tangible results, such as an increase in a company's competitive advantage.

Stakeholder theory postulates an organization that behaves ethically towards specific stakeholder groups and acts responsibly with respect to all stakeholders. This responsibility should be codified by a set of norms and standards in order to guarantee that the company fully meets its obligations towards stakeholders. Companies that strive to meet the interests of all partners who participate in the value creation process acquire greater value over time (Harrison, Wicks, 2013). From the stakeholders' point of view, economic value plays the most important role, but practice shows that stakeholders are also keen on deriving benefits other than the largest slice of the "cake". Such benefits include honesty and fairness, which are manifestations of the reciprocity principle (Bosse et al., 2009).

Table 1. Types of value created by stakeholders and the derived benefits

Value	Stakeholders / (derived benefits)	
	Direct	**Indirect**
ECONOMIC	• Suppliers • Company and competitors (coopetitors) • Complementaries • Customers (higher profits, lower costs, creation of new markets, creation of new revenue sources, lower prices, synergistic effects, increase in a company's competitive advantage)	
KNOWLEDGE	• Coopetitors (ability to learn, greater innovation, including high-risk innovations, higher competitive advantage, greater competitive potential, development of new technology, higher barriers to entry for non-coopetitors)	• Customers • Society (higher product quality, development of functional products, greater choice of products, more benefits derived with the purchased products, greater fulfillment of social needs)
SOCIAL AND ENVIRONMENTAL KNOWLEDGE	• Society (environmental protection, rational use of natural resources)	• Coopetitors (greater trust, improved image, higher competitive advantage)

Source: own study

Stakeholders regard a company's actions as fair and honest when the tangible results (profits) of cooperation with the company are, in their opinion, just. Therefore, the distribution of jointly created value plays an important role. Greenberg found a positive correlation between a company's profits and the just distribution of value (Greenberg, 1993). Stakeholders also have an interest in procedural justice (to have an equal say in developing the terms of cooperation) and interactional justice (human relations should be built on dignity and respect) (Bosse et al., 2009).

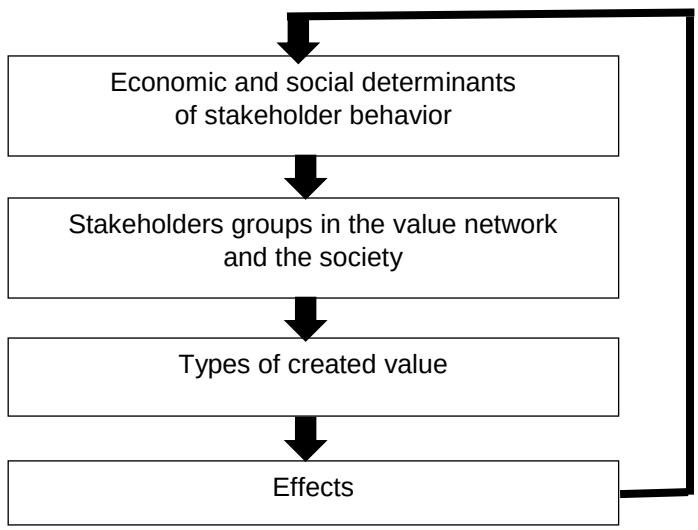
The extent to which the types of value created through coopetition can be harnessed is determined by several factors. Some of them, including fair destitution, procedural justice and interactional justice, have been discussed. However, other determinants can also be named. Community of interest is essential for creating shared value for stakeholders. The involved parties contribute resources for value creation or they influence the exchange of resources in return for access to tangible and/or intangible economic value. Another determinant that extends beyond community of interest includes shared norms and values relating to justice, reciprocity or even love, which increase trust (Harrison, Wicks, 2013). Companies willing to fulfill stakeholders' needs and expectations have to develop strategies that account for the interests of all interested parties.

A theoretical model of value creation through coopetition has been proposed based on the described determinants of cooperation between a company and its stakeholders (based on the stakeholder theory), stakeholder expectations and the created value (identified based on the value network and the environment). The model is presented in Figure 3.

In this model, the actions of stakeholders (elements of the value network) are influenced by economic and social factors. The key economic factors are higher revenues and lower costs which maximize a company's profits. The most important social factors are a sense of justice, reciprocity and community of interest. The type of value created through coopetition is determined by the various forms of exchange in the value network (economic and social exchange). The above supports the classification of value into economic value, knowledge value as well as social and environmental value. The type of value and the associated benefits thus determine the varied nature of the final effects for the stakeholders. Further empirical research is needed to describe those effects in greater detail. The

type and character of the resulting benefits determine the stakeholders' future behavior (their willingness to participate in the co-creation of value, the associated benefits and the quality of the resulting relationships).

Figure 3. Model of creating value for stakeholders through coopetition



Source: own study

Conclusions

The results of the conducted analysis indicate that three types of value can be created through coopetitive action. Economic value and knowledge value generate direct benefits for nearly all stakeholders in the value chain. Knowledge value is an exception because the associated benefits are derived only indirectly. The main recipient of social and environmental value is society, but coopetitors can also derive indirect benefits. Companies that enjoy the stakeholders' trust have a better public image and are perceived as socially responsible organizations, which can improve their competitive advantage. Further empirical research is needed to describe the benefits generated for all stakeholder groups in greater detail in order to identify stakeholder motivation for creating shared value and so as to verify the proposed theoretical model.

■ Chapter 3 ■

Business Strategies for SMEs and Larger Companies

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Abstract: The aim of the article is to present changes with regard to strategy formulationas noted in recent years. As late as in the 1970s, it seemed that a good plan and strategy were a question of knowledge, manager motivation, and the professional support of consultants. Nowadays, when the environment has become turbulent and unpredictable, the traditional understanding of a strategy is no longer valid. Recently, changes have becomeinstantaneous, competitionfiercer, fuelled by large international corporations conquering new markets, diminishing barriers in international trade, and technological developments. On the basis of literature research relating to the current trends in developing strategies a business model is proposed as an alternative to currently employed strategies. In the last part of the article subject of creativity and innovation in strategy construction is raised. The main conclusion of research comes down to the statement that dynamics and the turbulence of the organization's environment trigger the outdating of certain strategies. The companies which fail to note the significant changes in their environment and the resultant threats and opportunities, may be targeted by their more agile competitors.
Keywords: strategy, change, turbulence, competition

Introduction

As late as in the 1970s, it seemed that a good plan and strategy were all a question of knowledge, manager motivation, and the professional support of consultants. Nowadays, when the environment has become more turbulent and unpredictable, the traditional understanding of a strategy is no longer valid. Recently, changes have become more and more rapid, competition has been growing, fuelled by - amongst others - large international corporations

conquering new markets, diminishing barriers in international trade, and technological developments.

As a result, at the present time a number of companies tend to appoint a member of the board responsible for their corporate strategy. The professionalization of this subject area, with its roots in the 1980s, shifted the position of strategy formulation from the domain of chief executive to a major corporate function. In accordance with the report by McKinsey's employees, the process prompted the creation of new positions within companies, starting with heads of strategy, through strategic-planning directors, up to the relatively new function of a chief strategy officer (CSO). Today's unpredictable business environment is completely incompatible with what historically has been one of the main responsibilities of company strategists, i.e. the conduct of the annual process of strategic planning. The weaknesses of traditional strategic planning, featuring solely deliverables and meetings according to a rigid schedule, have been amplified by the crucial benefit of the novel strategic approach, i.e. the importance of flexibility of actions in a rapidly changing environment (Martin, 2014; Mintzberg, 1987).

Literature review

In January 2011, McKinsey conducted a survey of 2135 senior executives, asking the following question: Have you tested your strategy lately? Only 35 percent of respondents had developed a strategy which passed 3 out of 10 tests developed by McKinsey's employees. The tests aimed at verifying whether a strategy created by a given company could beat other competitive strategies. Many of the survey participants blamed the ineffectiveness of the annual planning process for the present state of a corporate strategy. Moreover, the process of traditional strategic planning was seen to have proved inefficient when it comes to absorbing the shock and disturbances that may strike a given market. When it came to stimulating contemporary discussions concerning corporate problems, which should occur frequently among senior management,corporate strategy performed badly also. According to the survey managers, effective organizations seem to transform strategy development into current ad hoc discussions on the part of members of the board pertaining to budgetary matters, and this obtains for regular meetings held throughout the year. Some organizations implemented an even more extensive democratic process of company strategy construction in the

form of various company blogs, videoconferencing, etc. or video games devoted to the subject (Birshan, 2014).

Company strategists have responded to the above specified challenges of the contemporary world with an increase in the scope and complexity of their roles within enterprises, which go beyond traditional planning. In general, many contemporary enterprises, have chosen to move away from standard thinking and to focus on creative-thinking strategies instead. This involves significantly less time being devoted to the process of planning and the involvement of broad groups, both internally and externally, so as to create a corporate strategy. In other words, this means going beyond the traditional ways of operation.

The most important of the said changes which result in the abandoning of a defunct strategic approach can be depicted as follows (Elkin, 2010, p. 25-26):

- relatively static economies → changeable, unstable economies
- durable products → short life cycle products
- constant customer's needs → growing customer's needs
- market-focus → segment-focus
- national (regional) markets → global markets
- technology ownership → free access to technology
- war of positions (strength) → war of actions (shrewdness)
- gaining market share → gaining segment dominance
- defensive → offensive
- reputation and strength → competencies and fast response
- "chess" strategy → "interactive video game" strategy.

In modern-day economies, the strategy management is impacted by fast-track technological and organizational changes, the shortening of product's life cycle, ongoing release of new products on the market, focusing on key company skills (auxiliary process outsourcing, which leads to a reduction of employment and an increase in company goodwill and turnover), aiming at company operation cost reduction, cooperation (to some extent) of the companies in the same industry, i.e. competitive companies. Technique and technology are evolving in a revolutionary manner, markedly faster than the processes, methods, and abilities of their application.

The dynamics and turbulence of the organization's environment mean that certain strategies have become outdated. The companies which fail to note the significant changes in their environment and the resultant threats and

opportunities may be targeted by their more agile competitors. Skilful observation of the reality in which contemporary enterprises happen to operate, and drawing proper conclusions therefrom, may lead to a decision about either modifying or entirely changing the company strategy (Wołczek, 2014, p. 1).

If the management decides to function in accordance with a strategy which proves ill-suited to the conditions of the surrounding environment and which does not correspond to the organization's potential, negative consequences will ensue. However, if a given organization decides to modify the strategy, it demonstrates the fact that the management is aware of the fact that following old patterns is no longer effective. Hence, efforts should be made to "renew" the organization. In other words, the company should reorient its methods of market operation. What should be taken into account are the current trends in strategic management.

According to Krzysztof Obłoj, the strategy which has had a substantial impact on business conduct over the last decade is company management oriented at increasing company value. Recently, the strategies associated with the maximization of company value in the context of shareholders (owners) have become highly popular around the world. Investors expect a more than average total return on capital investments, dividends; and true and reliable information regarding business conditions and perspectives.

The last sentence is based on the theoretical statement that the objective of every business activity is to increase its value. It is an underlying measure of market success. The analysis of a number of companies clearly shows that the most important position in the hierarchy of factors determining market achievements is occupied by the strategy. It is built on philosophical and cultural foundations via responsible persons. Equally crucial is also the implementation potential recognised in proper systems and structures (Kruger, 1989, p. 32). Here, it ought to be pointed out that the majority of the winners of the German Marketing Award thinks that in order to win, the following must be taken into consideration:

- philosophical aspect - the new way of thinking about the company, the customer and his/her needs,
- behavioural aspect - behaviours, expectations, feelings and emotions of the stakeholders,
- informational aspect - basing all decisions on reliable information,
- segmentation aspect - offers suited to individual customer groups,

- action aspect - integration and synchronization of marketing instruments,
- coordination aspect - streamlining the time and place, flexibility,
- social aspect - accounting for social and environmental aspects (Erichson, 1990).

All laureates of this award admitted that they used strategic marketing plans comprising precise targets as their map and compass. Similarly to the process of production, where the most expensive and difficult to correct are mistakes made at the design stage, in marketing the most costly mistakes are those involving a crisis of identity and the moving away from the adopted strategy (Bacior, 2015). One may select a rational marketing strategy increasing company value with the application of a matrix proposed by H.I. Ansoff (Ansoff, 1957), which isa group of strategies based on product-market relations (understood as a group of current and potential buyers of a given product).

According to Andrzej Szablewski (2008), the majority of works developing research regarding the strategy of company values management focuses on the financial sources and factors of company value growth. Even though the financial position is crucial, over the past few years many new research streams have emerged which have broadened and extend knowledge about the subject. Above all, it is worth noting the importance of four tendencies:

- the formulation of a corporate development strategy requires the application of a strategic balanced scorecard (Kaplan, 2001), i.e. looking at company's future from four equal perspectives: financial, customer, internal processes, and organizational learning;
- among the sources of company value, the focus is repositioned from financial to marketing and intangible generators, related mainly to intellectual capital (Kasiewicz, 2006) and customers' capital (Dobiegała-Korona, 2006);
- the condition to enjoy market success and multiply company value is to take notice of the essential ethical norms, which are honesty, good will, partnership, and openness (Welch, 2005); for these are the basis for the generation of social trust in a company, and trust has become a more significant element of company strategy;
- under the conditions of globalization, the question of corporate social responsibility and philanthropy gains a new meaning, especially

in the context of long-term improvement of competitiveness and goodwill increase (Szablewski, 2008).

Results and discussion

The challenges of strategic planning in the moden-day world have led to a breakthrough in the theory of strategic management. According to it, and in line with the book by Maria Romanowska published in 2017 and entitled: „Planowanie strategiczne w przedsiębiorstwie" ("Corporate Strategic Planning"), in recent times, the idea of substituting the strategy of development with a business model has emerged. Here, it should be highlighted that the term business model is more extensive than the term strategy. This business model specifies the method of functioning in a given branch and does not take into account crucial developmental decisions involving the entering of new geographic markets and industry diversification. The approach which releases managers of the duty to perform an orderly, system and systematic prognosis and plan of the whole business and replacing it with a less ambitious task of developing an effective profit model is highly attractive to managers, frequently lost in the rapidly changing world. The business model is also referred to as the model of activity (operation) which is defined as the "total of everything the company does to gain profit". The business model comprises all strategic choices as well as operational management and its support in auxiliary functions - the shaping of organizational structures, HR policy, information flow, always performed in relation to a new offer for a given client. (Romanowska, 2017).

All good business models in a large, diversified corporation will never replace a strategy of development, even an imperfect one, for the latter covers the whole corporation. In line with this opinion, G. Hamel and L. Välikangas draw our attention to the fact that the ability to create new business models offering repetitive market and financial success is the matter of a strategic regeneration capacity, which involves much more than the business model on its own. The term business model was used for the first time to describe the mode of operation of Microsoft on the software market. The business model notion was introduced into literature in the year 1997 by the authors of the concept of value migration - A.J. Slyvotzky, D.J. Morrison and B. Andelman.

However, models tend to become obsolete as the macro-environment and companies change. One interesting example is that of the budget airlines

Ryanair. When Michael O'Leary became the company director in the year 1994, he declared that the company would not be able to compete with larger air carriers if it did not come up with a new idea of generating revenue. Copying and enhancing the solutions already used by the American Southwest Airlines, he developed a perfect model of budget airlines, which resulted in the cheapest plane tickets being offered in the industry. The business model remained attractive for nearly 20 years, until the time when many competitors applied the same business model and other airlines lowered their prices.

Creativity and innovation ought to be of primary importance in strategy construction for management boards. These are present-day targets that the majority of organizations wishes to meet. Innovation has risen to the position of the basic idea of strategists. At the same time, it has become a guarantor of market success (Nowicka-Skowron, 2009). The landscape of the competition within which business entities operate nowadays often forces them to come up with unconventional, original products/services, or organizational solutions (Nowodziński, 2013). Creativity and innovation are a driving force behind civilizational progress, using the ability to harnessing as they do creativity in organizations. The potential of contemporary organizations grows as far as their effectiveness and competitive edge are concerned.

Contemporary global economies based on knowledge and information are oriented towards development of innovative technologies. Therefore, there is a need to develop, implement, and then perfect the technological strategy. These are the challenges not only for production establishments but also for services companies; and this is because innovations are the key strategic assets. Given the expectations of today's customers, products and services should be manufactured by qualified employees, developed on the basis of modern technologies and materials, and be competitive on a global scale. Today, customers are highly demanding, has quick access to information, and strives to improve his/her quality of life. As a consequence, enterprises need to meet an increasing number of challenges, and offer products and services which have the greatest added value. Research (data composed on the basis of the research conducted by The United Nations Industrial Development Organization and The International Centre for Science and High Technology) shows that companies which follow a concentrated and cohesive strategy in terms of innovation stand a much bigger chance of gaining and maintaining

a competitive advantage. Those, in turn, which lack a strategy, may achieve a transient success, as they will not be able to enjoy it for longer periods.

According to Porter, the technology strategy involves orienting company operations towards the development and application of new technologies (Porter, 1985). Dodgson, on the other hand, sees the technology strategy as "(...) an understanding within a firm - amongst senior management, but diffused throughout the organization - of the importance and potential of technology for its competitive position, how in the future that potential is to be realized, and how this complements other aspects of strategy: growth, finance, marketing, personnel, etc" (1989). Both definitions have some common features which allow us to conclude that the technology strategy is a multi-aspect collection of actions and intentions oriented towards the analysis, implementation, monitoring and improving technology, with a view to attaining key technological competencies by an organization in order to gain competitive advantage. For the technological strategy to be effective, it must be compatible with the corporate business strategy.

In addition to the idea of innovation, immanently related to technology, another factor of essential significance to a company is creativity, particularly the kind of creative attitude/and thinking which produces such cognitive processes that generate new ideas, concepts or associations concerning relations between the existent ideas and concepts. Therefore, translating this creativity context into the language of an enterprise gives rise to original products, services and processes. Thus, creative organizations are those which can see a gap in the market faster than the competition may by adopting new technical or organizational solutions.. In order to avoid strategic convergence, creativity within organizations is becoming a highly valued competency (Pabian, 2010). For present day organizations, hyper-competitive and sensitive markets, strategy must incorporate creativity, inventiveness, and non-standard, out-of-the-box solutions. Thus, the art of strategy is an integral element of every enterprise. Today, executives must apply more than the management methods and techniques which are already known. Newly funded strategies are mainly based on creativity, an awareness of the vision of development, and respect for unconventional solutions (Nowodziński, 2013).

Conclusions

What has been presented allows us to state that today's strategy formulation is related to the evolution in the understanding of the complexity of our environment. In view of the observation of the world of contemporary organizations, their participants have no ability to foresee the exact consequences or to assess the risk of their undertakings (despite a continuously growing technology and infrastructure apparatus, i.e. IT and communication). Due to the above, the rationality of the process is limited (Simon, 1991).

■ Chapter 4 ■

Advanced Assistive Technologies and Digital Inclusion – the case studies of the MATUROLIFE and DIGITAL ACCESSIBILITY projects

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Abstract: This paper describes a preliminary study into the impact of assistive technologies (ATs) and particularly the impact which Information and Communication Technologies (ICT) may have on social inclusion. The basic research problem of the study is the question of whether and to what extent technology, in particular ICT, opens up new areas of activities in which elderly people and persons with disabilities can have better access. The case studies of two projects: "MATUROLIFE" and "DIGITAL ACCESSIBILITY" are presented in the article; and through the combination of primary and secondary research, several social, technical and economic trends are identified. These are used to compile three explorative scenarios about the future of AT and its impact on digital inclusion.
Keywords: assistive technologies, social inclusion, digital inclusion

Introduction

In Europe over 73 million people have disabilities and globally the figure is over a billion (Eurostat, 2018). Individuals can experience different types of disabilities including visual, hearing, speech, mobility, cognitive, and psychosocial. Many individuals also experience the onset of disabilities as they age. The global population aged 60 years or over numbered 962 million in 2017 and it is expected to more than double by 2050, when it is projected to reach nearly 2.1 billion (United Nations, 2017). Physical inaccessibility has been one of the primary factors for the marginalization of persons with disabilities

and older people. Everything from being able to travel, enter a school or work site, perceive and understandwhat is written, hear and communicate with family, teachers, workmates, and peers, access recreation or socialization can become a barrier. However, in the economy that is based on digital computing technologies the main barrier is the lack of ability on the part individuals and groups to access and use information and communications technologies (ICT). In the digital age, when we see the digital revolution intensifying, governments, non-profits, and businesses worldwide are searching for ways to cope with digital inclusion as an element of social inclusion, taking into account the needs of persons with disabilities and the ageing population. Social inclusion is a multi-dimensional process aimed at creating conditions which enable the full and active participation of every member of society in all aspects of life, including civic, social, economic, and political activities and the process aims at improving the ability, opportunity, and dignity of those disadvantaged on the basis of their identity to take part in society (Das, 2016).

Nowadays, the world is at a critical juncture when it comes to digital transformation. Information and communication technologies continue to develop rapidly and are combining in novel and innovative ways, pushing digital transformation in new unpredictable directions. Therefore, there is an urgent need for governments and stakeholders to shape a common digital future that makes the most of the immense opportunities that digital transformation holds to improve people's lives. They all view extending access to ICT with greater urgency to create a more enabling and competitive society.

The United Nations in 2016 declared Internet access a basic human right, that should be extended to all citizens of the world. In particular, the agency has declared "online freedom" as a basic right that must be nurtured by all nation states (United Nations, 2016). Despite the fact that the UN's resolution is not binding, it is meant as a guideline to nations to properly protect and secure people's right to internet access and expression online. It also serves to put pressure on countries that actively suppress internet access and freedom of speech, and gives credence to activist groups. The potential contribution of Assistive Technologies (ATs) to increase social inclusion and the independence of older people is the subject of continuously exploration.

This paper describes a preliminary study into the impact of Assistive Technologies and particularly the impact which Information and Communication Technologies may have on social inclusion. Therefore the basic research problem is the question of whether and to what extent

technology, in particular ICT, opens up new areas of tasks in which elderly people and persons with disability can have better access. The case studies of two projects: "MATUROLIFE" and "DIGITAL ACCESSIBILITY" are presented here and through the combination of primary and secondary research, several social, technical and economic trends are identified. Such findings are used to compile three explorative scenarios about the future of AT and its impact on digital inclusion of persons with disabilities and elderly people.

The importance of digital transformation

Most countries in the world will move towards digital transformation. Almost half of the world's population is now connected to the Internet, up from only 4% in 1995. In 2016, 83% of adults in the OECD area accessed the Internet and 95% of firms in OECD countries had a high-speed Internet connection (OECD, 2018). Therefore, digital transformation affects all aspects of the economy and society in complex and interrelated ways. But the digital transformation may have both positive and negative impacts; and various groups of population experience these impacts. Particularly vulnerablegroups are persons with disabilities and older people.

One of the issues with important implications for the assessment of disability is the distinction between legal and biological disability. These two categories are not identical. The first of these categories refers to a judgment system regarding disability. This is the situation when a person who has a disability certificate issued by a competent authority may not feel limited in their ability to perform their daily activities. This situation can be interpreted as either an error in the legal judgement system or the success of a support system that has eliminated the barriers. The second category refers to biological disability, which is a subjective assessment of the person pertaining to limitations in their everyday functioning. A much greater and more frequent problem will be a situation in which a person does not have a legal decision about disability but experiences different barriers in ordinary, basic, life activities. This particularly applies to older people with retirement benefits who do not need a disability certificate (Antczak, Grabowska, Polańska, 2018, pp. 21-43) From the digital inclusion perspective, the assessment of biological disability is much more important than the assessment of legal disability. Information and communication technologies can help people experiencing

limitations in their daily functioning, and thus it is crucial to ensure the availability of ICT and the ability to use them by all possible social groups. Digital inclusion should be therefore promoted in all possible ways. Institutions such as schools and libraries play a key role in this process. They usually can provide free access to digital technologies including hardware, software and the Internet. Moreover they can also provide digital content to their respective communities, as well as improve digital literacy skills through practical training programs and workshops.

In the next part of the article the focus is placed on ATs for two specific disabilities. The first is blindness and visual impairments, which ranges from mild disorders to severely limited visual perception and blindness; the second is deafness and hearing impairments, which ranges from minor disorders and range limitations to more severe impairment and deafness. The occurrence of vision loss and blindness in Europe is estimated at 2.9% and 0.3% respectively. The occurrence of hearing impairments which is correlated to the ageing population, is around 10% of all adults suffering some form of hearing impairment but the figure rises to 50% for people in their 80s. However, loss of vision, like hearing impairment, correlates with ageing, and around 81% of those with severe impairments or blindness are over 50 years old (Boucher, 2018, p. 5). Both of those disabilities can present barriers to an individual's participation in society, including access to education and employment, and these barriers extend to the digital economy. Despite the fact that we can observe an increase in the supply of Assistive Technologies, many of them remain unused.. However, some of the mainstream technologies, such as smartphones, through a special configuration may be used to assist people with disabilities, and may help them to overcome some of the barriers to their participation in the digital economy. The detailed classification of existing ATs for blindness and visual impairment which include 1) haptic aids, 2) travelling aids, 3) AT for accessible information and communication, 4) AT for daily living 5) phone and tablet applications for the blind and visually impaired people; and also the classification of AT for deaf and hearing impaired people which include three broad classes of devices: 1) hearing technology, 2) alerting devices and 3) communication technology; was developed by the Scientific Foresight Unit of European Parliament (Nierling et al., 2018, pp. 26-39). Table 1 shows examples of barriers to participation by disability type and the relevant ICT solutions.

Table 1. Barriers to participation by disability type and relevant ICT solutions

Disability category	Examples of barriers in social, economic, and community participation	Examples of accessible technology solutions
Visual Disability Includes total blindness Or low Visio	• Reading print (e.g., textbooks, instructions, documents) and writing (e.g., signing checks, legal documents •Accessing visual information in print or audiovisual media (for example, warnings and information in text scrolls on television) •Navigating new surroundings	• Text-to-speech rendition and speech/voice output • Braille displays • Screen and text magnification • Voice recognition • Audio description of graphic and visual media • Electronic audio signage • GPS-facilitated navigation • Optical character or image recognition • Changing screen brightness, colour contra
Hearing disability Total or partial hearing loss	• Hearing lessons, warnings, and other auditory information in person or over audio media such as the radio or television. •Communicating with others including educators, peers and colleagues, clients, first responders, government personnel, and others.	• Closed and open captioning, subtitles for videos, TV programming • SMS, text messaging • Text Telephone or Telecommunication Device for the Deaf (TTY/TDD) which allow text messaging over the phone line • Telecommunications Relay Services which allow text to speak conversions through an operator •Use of vibrations/text alerts instead of audio alerts

Source: D.S. Raja (2016), *Bridging the disability divide through digital technologies,* p. 8 http://www.worldbank.org/en/publication/wdr2016

Currently, the promotion of social inclusion through digital inclusion facilitates a more comprehensive participation of persons with disabilities in social life. As it was shown in the above table, there exist relevant information and communication technology solutions, and they are increasingly enabling persons with disabilities to level their chances in terms of accessing lifelong education, skills development, and employment (Broadband Commission, 2013). Moreover, the growing number of mainstream, everyday appliances of information and communication technologies, such as mobile devices and desktops, are increasingly offering features that facilitate communication and

access to information for people with disabilities. Functions, that in the past required special software or hardware, such as text-to-speech, voice recognition, the ability to change contrast and colour schemes, touch and gesture input, screen magnification, and many others, are now more often embedded in products for regular users. Thanks to information and communication technologies, people with disabilities have the opportunity to receive information and content in a format they can perceive and prefer. For example, a person with visual impairments can use speech or text functions to read a web page, people with hearing impairments can use text or other text messages to communicate, and a person with a movement disability may use voice recognition to operate and navigate the digital device.

In addition, the Internet and ICT are becoming more and more popular channels of socio-economic development; and by enabling direct interaction between producers and markets around the world, they facilitate new ways of providing personalized public and social services, creating new income channels, and of contributing to poverty reduction. However, the situation of persons with disabilities on the labour market has not seen any amelioration. Although, in recent decades there a significant change has been noted in the labour market, characterized by the increasing use of computer technology in the workplace; the first consequence of this change has been the replacement of human work with technology. From the research conducted in Germany over the course of many years pertaining to the influence of digitalization on the tasks of employees with disabilities, it has not been observed that the growing use of technological tools in the workplace has allowed disabled workers to perform more complex tasks in order to mean a given demand. Additional findings from this study indicate that technology deployment in the workplace is increasingly replacing simple tasks and creating newer and more complex requirements for employee qualifications. The research findings show that technology is becoming more and more complicated and difficult to use because the complexity of the application is continuously growing and thus the process of digitalization is giving rise to more complex work processes. This is related to an increase in skill requirements and the reduction or outsourcing of simple tasks. This has created worse opportunities on the labourmarket for people with disabilities. The implementation of technology in the workplace is basically related to the benefits for people with disabilities because burdensome tasks are increasingly performed by machines and robots. However, with regard to functional

limitations concerning mobility, sight and hearing impairments, the use of Assistive Technology devices may facilitate many tasks; but the effectiveness of those devices will only be high if they are compatible with other devices and programs used. In order to achieve high effectiveness, it is necessary to support people with disabilities in other aspects, such as reduced work and time pressure, and the optimization of work processes (Weller, 2019).

Assistive technologies in digital economy

Assistive technology (AT) is any item, piece of equipment, software program, or product system that is used to increase, maintain, or improve the functional capabilities in learning, working, and daily living of persons with disabilities (ATIA, 2019). Although there are few categories of ATs, such as low-tech (e.g. wheel chairs, walkers) or high tech (e.g. special-purpose computers) hardware devices, the stu dy investigate the role of Information and Communication Technology devices (e.g. special switches, keyboards, pointing devices, and software such as screen readers and communication programs) and other advanced products or materials such as smart textiles, that can be used as assistive technologies.

Assistive Technology may help people who have difficulty when speaking, typing, writing, remembering, pointing, seeing, hearing, learning, walking, and many other things; therefore different disabilities require different assistive technologies, however, due to the fact that the use of AT is symbolically, culturally and historically contextual, it may in some situations hinder social inclusion. Assistive Technology devices may therefore be more often questioned or rejected. As an example, cochlear implants mayprove informative. The devices are rejected by deaf people, because they perceive themselves as cultural and linguistic minorities and consider these implants as a symbol of the medicalized perception of deafness, forcing them to speak the language. Assistive Technologies are rejected mainly because people feel stigmatized due to the design and external appearance of these devices. Especially when an Assistive Technology device is a dual identity marker: on the one hand, it is an independence tool, and on the other hand it is also a symbol of a person's inability to work and their dependence on others. In addition, ATs are often rejected due to a lack of access to Assistive Technology; no information about devices, repairs and maintenance, changes in the user's functional abilities or activities, inflexibility or ineffective device performance;

minimal or no need for the device; negative family attitudes, and also a lack of motivation to use the device (Ravneberg, Soderstrom, 2017, p. 9).

In the Digital Economy, information and communication technologies (ICT) represent an opportunity for the social integration of a person with disability, and also for older persons. An increase in the importance of digital data also means that good (broadband) internet connections, that make it possible to access or deliver new content, applications and services, are essential for promoting social inclusion. Moreover, when citizens do not have access to broadband, it may have profound implications on their economic potential.

ICT enables the use of multiple means of communication: example voice, text, and gestures – in order to enable disabled people to access information and engage with others, and hence can help them to address long standing barriers of communication and interaction. ICT plays a crucial role in promoting the independence and full participation of persons with disabilities across life domains. It represents an important enabler of accessibility to systems and services, access information and uphold freedom of expression an opinion. This is confirmed in the United Nations Convention on the Rights of Persons with Disabilities (CRPD), a human rights treaty which specifically addresses the rights and needs of persons with disabilities; which came into force in 2007 (United Nations, 2007), and has been ratified by more than 150 countries. The Article 9 of the convention obliges Member States to take appropriate measures to ensure access for persons with disabilities, on an equal basis with others, to, inter alia, information and communication technologies, including the internet. Countries that have signed the Convention were expected to submit a report on progress toward its implementing within two years of its taking force. Moreover advocacy organisations had to publish their own shadow reports (Bratan et al., 2018).

Also, the European Parliament has approved a directive on making the websites and mobile apps of public sector bodies more accessible. This means that people with disabilities – especially persons with vision or hearing impairments – will have better access to the websites and mobile applications of public services (Directive (EU), 2016/2102). As part of its Europe 2020 strategy, in 2010 the European Union set three targets for broadband: by 2013, to bring basic broadband (up to 30 Megabits per second, Mbps) to all Europeans; by 2020, to provide all Europeans with fast broadband (over 30 Mbps); and by 2020, to ensure take-up by 50% or more of European

households to ultra-fast broadband (over 100 Mbps). To support these objectives, the EU implemented a series of policy and regulatory measures and made some 15 billion euro available to Member States for the period 2014--2020, through a variety of funding sources and types, including 5.6 billion euro in loans from the European Investment Bank (EIB). However, according to the report of European Court of Auditors published in 2018 Europe 2020 targets will not all be achieved. Broadband coverage has generally been improved across the EU, but rural areas remain less well connected than cities, and the take-up of ultra-fast broadband is significantly behind target. For example, only 15% of households had subscribed to ultra-fast broadband internet connections by mid-2017, against a target of 50% by 2020 (European Court of Auditors, 2018 p. 8).

The case study 1: MATUROLIFE project

Metallisation of Textiles to make Urban living for Older people more Independent & *Fashionable* – the MATUROLIFE project was founded under the European Research and Innovation Programme HORIZON 2020, the topic NMBP-05-2017 – *Advanced materials and innovative design for improved functionality and aesthetics in high added value consumer goods*. The project, which began in January 2018, looks to address the development of innovative advanced material solutions, among others, smart textile fabrics; all of which go toward making living significantly easier: more sustainable, more comfortable, more secure, and more functional.

The specific objective of advanced materials research and innovation is to develop materials with new functionalities and facilitate improved in-service performance, and also to ensure more competitive and safe products. The project builds on existing technological advances in materials which have produced a highly innovative selective metallisation process that utilises nanotechnology, electrochemistry and materials science in order to encapsulate fibres in textiles with metal, and thereby provide conductivity and electronic connectivity. In this way, better integration of electronics and sensors into fabrics and textiles will be possible. It is expected that this will give fashion designers and artists the tools to produce an AT for older people that is not only functional but is more desirable and appealing, as well as being lighter and more comfortable.

The expected results of the project include highly innovative, conductive, multi-functional textile products and intelligent fabrics, enabling the production of new assistive technology prototypes. The AT prototypes created in the project include shoes, furniture (e.g. sofas) and clothes. Such products with metallised textiles (smart textiles) can have many different applications in everyday life. The key functions of the prototypes are related mainly to protection and health. The function of protection includes: detecting conditions that prevent danger; preventing accidents by sending a signal when dangerous conditions are detected; providing instantaneous protectio; against thermal radiation; and for anti-static protection.

The functions of health include: warning on the evolution of a disease; diagnosing a disease and monitoring the physiological variables of a user; automatically alerting; and collecting data and sending it to telemedicine centres via a communication network.

The newly created products will respond to current and future social challenges related to the urban life of older people and people with disabilities. The project consortium actively cooperates with societal stakeholder groups representing end users of the products. Importantly, older people and persons with disabilities are heavily involved in the design process. They also feedback and direction on the development of AT prototypes, thus contributing significantly to end-user acceptance[1].

The case study 2: DIGITAL ACCESSIBILITY project

The Certified Digital Accessibility Training (Digital Accessibility) project, begun in 2018, is funded under the Erasmus+ Programme, KA2 - *Cooperation for innovation and the exchange of good practices* KA202 - *Strategic Partnerships for vocational education and training*. The aim of this project is to develop vocational training modules focused on digital accessibility aimed at improve the knowledge, skills and the competencies of key stakeholders according to web accessibility standards. Thanks to this kind of training, the visual, auditory, physical or cognitive needs of persons with disabilities, to also include older people, low literacy website visitors and apps users, will be able to better access the information and benefit from the digital era.

[1] More information can be found at the project website: www.maturolife.eu.

The training modules will improve the competences of Vocational Education and Trainings (VET) learners, students as future experts and existing professionals in the field of developing and designing websites, all so as to allow them to contribute to more inclusion and equity in education and lifelong learning. The project is based on the key assumption of increasing the importance of digital web resources in many aspects of life, such as: education, employment, government, commerce, health care, recreation, access to information and others. The project looks to contribute to improving the digital accessibility of web content and supporting equal access and equal opportunity to persons with disabilities, who can then more actively participate in society.

The results of the project include four training programs, of which two are dedicated as new job roles for persons with disabilities. They are: Digital Accessibility Manager and Digital Accessibility Tester. Two other programs are addressed to professionals as up-skilling trainings in order to help meet evolving market needs. They are: Web Developer with expertise in Digital Accessibility and Web Designer with expertise in Digital Accessibility. Designing the above trainings, testing them, and then international dissemination, will contribute to the increase of information and communication accessibility which is necessary for the social and digital integration of persons with disabilities in information society and digital era.

The project activities are fully in line with the European Disability Strategy 2010-2020, which among several proposed actions include web accessibility, with the objective "to ensure accessibility to goods and services including public services and assistive devices for people with disabilities"[2].

Scenarios for Assistive Technologies

Three exploratory scenarios about the future of AT and its impact on digital inclusion are presented here. Visions were used as targets and three scenarios were developed to showcase examples of how these visions could be achieved. Each scenario include five elements which describes the situations in the future in which persons with disability and elderly people can be found:

[2] More information can be found at the project website: https://www.facebook.com/digitalaccessibilityproject/.

Table 2. Analysis of trends in the environment having an impact on the Assistive Technologies sector for digital inclusion of persons with disabilities and elderly people in Europe in 5 years' time

Factors in the environment	Trend	Impact factor from -5 to +5	Probability (0-1)
Economic area			
Economic situation in Europe (GDP per capita)	growth stabilization regress	+5 +1 -4	0,25 0,70 0,05
Vocational integration of persons with disabilities (unemployment rate of PWD)	growth stabilization regress	+5 +1 -4	0,50 0,45 0,05
Amount of public funds for social integration for persons with disabilities, including tax reduction due to expenses for rehabilitation (Euro)	growth stabilization regress	+5 +1 -5	0,50 0,45 0,05
Mobility of persons with disabilities and their assistants or carers (number of European Mobility Cards)	growth stabilization regress	+5 +2 -3	0,60 0,35 0,05
Sale of Assistive Technologies ICT devices	growth stabilization regress	+5 +2 -3	0,50 0,35 0,05
Technological area			
Development of information and communication technologies for digital integration of persons with disability (number of AT ICT devices launched)	growth stabilization regress	+5 +3 -3	0,80 0,15 0,05
New assistive technologies devices more attractive: lighter, safer, stronger, easier to use (number of new AT launched)	growth stabilization regress	+5 +2 -1	0,70 0,25 0,05
Development of medical technologies compensating disabilities - health science	growth stabilization regress	-1 +2 +3	0,75 0,25 0,05
Availability of ultra-fast broadband internet	growth stabilization regress	+5 +1 -3	0,80 0,15 0,05
Innovative ways of transmitting and receiving digital information	growth stabilization regress	+5 +2 -4	0,70 0,25 0,05
Social area			
Population of people with disabilities	growth stabilization regress	+3 +2 -1	0,65 0,25 0,10

Population of elderly people: 65 plus	growth stabilization regress	+4 +3 -2	0,85 0,10 0,05
Educational integration of persons with disabilities and elderly people in education, (e.g. third age universities)	growth stabilization regress	+4 +1 -4	0,60 0,35 0,05
Persons with disabilities and elderly people enjoying recreational and tourist services	growth stabilization regress	+4 +2 -2	0,70 0,25 0,05
Persons with disabilities participating in social and vocational rehabilitation (participants in occupational therapy)	growth stabilization regress	+3 +1 -1	0,50 0,45 0,05
Political and legal area			
Proportion of PWD in municipality councils and local authorities offices and departments	growth stabilization regress	+4 +2 -3	0,50 0,45 0,05
Laws, resolutions and ordinances of public bodies, supporting persons with disabilities	growth stabilization regress	+3 +1 -2	0,50 0,45 0,05
Representation of disabled people in local self-governments (Number of plenipotentiaries of PWD in local governments)	growth stabilization regress	+3 +1 -2	0,70 0,25 0,05
Advocacy for the rights of people with disabilities (Number of social organizations fighting for the rights of PWD)	growth stabilization regress	+3 +1 -2	0,70 0,25 0,05
Availability of electronic voting procedures (number of European countries having the electronic voting procedures available)	growth stabilization regress	+5 +1 -2	0,70 0,35 0,05
International area			
Number of countries complying with the rules of United Nations Convention on the Rights of Persons with Disabilities (CRPD	growth stabilization regress	+2 +1 -2	0,70 0,25 0,05
Iimplementation of Directive (EU) 2016/2102 of the European Parliament and of the Council of 26 October 2016 on the accessibility of the websites and mobile applications of public sector bodies (countries with full implementation of directive)	growth stabilization regress	+3 +1 -2	0,70 0,25 0,05
Accessibility of websites and mobile applications - number of websites and application complying with WCAG standards in business and civic sector	growth stabilization regress	+3 +1 -2	0,60 0,35 0,05

Cooperation in the field of social integration, including digital integration between organizations from different countries; exchange of good practice in field of digital inclusion (Number of international projects on disabilities)	growth stabilization regress	+2 +1 -1	0,60 0,35 0,05
Establishing international funds for people with disabilities	growth stabilization regress	+3 +1 -2	0,50 0,45 0,05

Source: own studies, 2019

Taking into account the data included in table 2, it is possible to build three scenarios of the environment states: optimistic, pessimistic and most likely (tables 3-5).

Table 3. Optimistic scenario - trends having a positive impact on the Assistive Technologies sector for digital inclusion of persons with disabilities and elderly people in Europe in 5 years' time

The elements of scenario	Impact factor
Economic area	
Growth of economic situation in Europe (GDP per capita)	+5
Growth of vocational integration of persons with disabilities (unemployment rate of PWD)	+5
Growth of amount of public funds for social integration for persons with disabilities, including tax reduction due to expenses for rehabilitation (Euro)	+5
Growth of mobility of persons with disabilities and their assistants or carers (number of European Mobility Cards)	+5
Growth of sale of Assistive Technologies ICT devices	+5
The average impact factor	**+5**
Technological area	
Growth of development of information and communication technologies for digital integration of persons with disability (number of AT ICT devices launched)	+5
Growth of new assistive technologies devices more attractive: lighter, safer, stronger, easier to use (number of new AT launched)	+5
Regress of development of medical technologies compensating disabilities-health scienc	+3
Growth of availability of ultra-fast broadband internet	+5
Growth of innovative ways of transmitting and receiving digital information	+5
The average impact factor	**+4,6**
Social area	
Growth of population of people with disabilities	+3
Growth of population of elderly people: 65 plus.	+4
Growth of educational integration of persons with disabilities and elderly people in education, (e.g. third age universities)	+4

Growth of persons with disabilities and elderly people enjoying recreational and tourist services	+4
Growth of persons with disabilities participating in social and vocational rehabilitation (participants in occupational therapy)	+3
The average impact factor	**3,6**
Political and legal area	
Growth of proportion of PWD in municipality councils and local authorities offices and departments	+4
Growth of laws, resolutions and ordinances of public bodies, supporting persons with disabilities.	+3
Growth of representation of disabled people in local self-governments (Number of plenipotentiaries of PWD in local governments)	+3
Growth of advocacy for the rights of people with disabilities (Number of social organizations fighting for the rights of PWD)	+3
Growth of availability of electronic voting procedures (number of European countries having the electronic voting procedures available)	+5
The average impact factor	**3,6**
International area	
Growth of number of countries complying with the rules of United Nations Convention on the Rights of Persons with Disabilities (CRPD	+2
Growth of implementation of Directive (EU) 2016/2102 of the European Parliament and of the Council of 26 October 2016 on the accessibility of the websites and mobile applications of public sector bodies (countries with full implementation of directive)	+3
Growth of accessibility of websites and mobile applications - number of websites and application complying with WCAG standards in business and civic sector	+3
Growth of coperation in the field of social integration, including digital integration between organizations from different countries; exchange of good practice in field of digital inclusion (Number of international projects on disabilities)	+2
Growth of establishing international funds for people with disabilities	+3
The average impact factor	**2,6**

Source: own studies, 2019

Table 4. Pessimistic scenario - trends having a negative impact on the Assistive Technologies sector for digital inclusion of persons with disabilities and elderly people in Europe in 5 years' time

The elements of scenario	**Impact factor**
Economic area	
Regress of economic situation in Europe (GDP per capita)	-4
Regress of vocational integration of persons with disabilities (unemployment rate of PWD)	-4
Regress of amount of public funds for social integration for persons with disabilities, including tax reduction due to expenses for rehabilitation (Euro)	-5

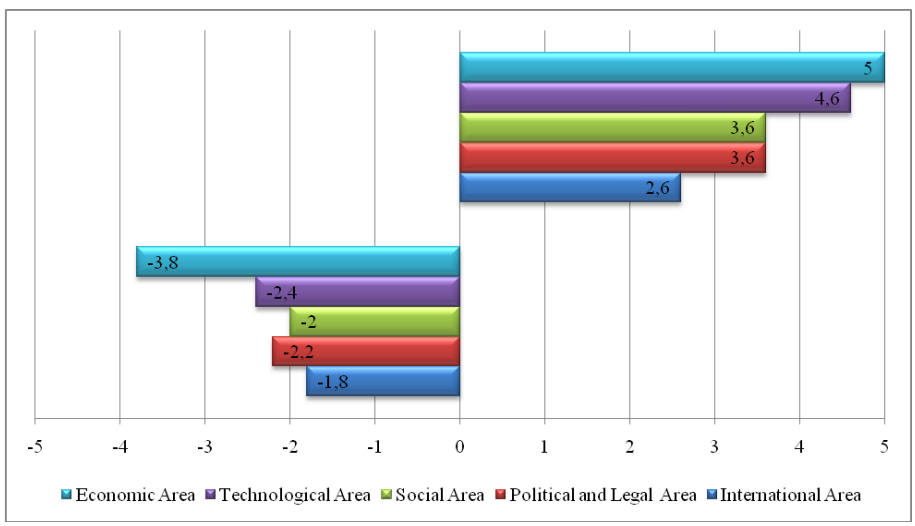
Regress of mobility of persons with disabilities and their assistants or careers (number of European Mobility Cards)	-3
Regress of sale of Assistive Technologies ICT devices	-3
The average impact factor	**- 3,8**
Technological area	
Regress of development of information and communication technologies for digital integration of persons with disability (number of Assistive Technologies - ICT devices launched)	-3
Regress of new assistive technologies devices more attractive: lighter, safer, stronger, easier to use (number of new ICT Assistive Technologies launched)	-1
Growth of development of medical technologies compensating disabilities - health science	-1
Regress of availability of ultra-fast broadband internet	-3
Regress of innovative ways of transmitting and receiving digital information	-4
The average impact factor	**- 2,4**
Social area	
Regress of population of people with disabilities	-1
Regress of population of elderly people: 65 plus	-2
Regress of educational integration of persons with disabilities and elderly people in education, (e.g. third age universities)	-4
Regress of persons with disabilities and elderly people enjoying recreational and tourist services	-2
Regress of persons with disabilities participating in social and vocational rehabilitation (participants in occupational therapy)	-1
The average impact factor	**-2,0**
Political and legal area	
Regress of proportion of PWD in municipality councils and local authorities offices and departments	-3
Regress of laws, resolutions and ordinances of public bodies, supporting persons with disabilities	-2
Regress of representation of disabled people in local self-governments (Number of plenipotentiaries of PWD in local governments)	-2
Regress of advocacy for the rights of people with disabilities (Number of social organizations fighting for the rights of PWD)	-2
Regress of availability of electronic voting procedures (number of European countries having the electronic voting procedures available)	-2
The average impact factor	**- 2,2**
International area	
Regress of number of countries complying with the rules of United Nations Convention on the Rights of Persons with Disabilities (CRPD	-2
Regress of implementation of Directive (EU) 2016/2102 of the European Parliament and of the Council of 26 October 2016 on the accessibility of the websites and mobile applications of public sector bodies (countries with full implementation of directive)	-2

Regress of accessibility of websites and mobile applications - number of websites and application complying with WCAG standards in business and civic sector	-2
Regress of cooperation in the field of social integration, including digital integration between organizations from different countries; exchange of good practice in field of digital inclusion (Number of international projects on disabilities)	-1
Regress of establishing international funds for people with disabilities	-2
The average impact factor	**- 1,8**

Source: own studies, 2019

The situation in the Assistive Technologies sector for the digital inclusion of persons with disabilities and elderly people in Europe in 5 years' time – Optimistic Scenario versus Pessimistic Scenario is shown on the Fig. 1.

Fig. 1. Situation in the Assistive Technologies sector for digital inclusion of persons with disabilities and elderly people in Europe in 5 years' time – Optimistic Scenario versus Pessimistic Scenario



Source: own studies, 2019

Figure 1 shows that in the Assistive Technology sector for the digital inclusion of persons with disabilities and elderly people in Europe in 5 years' time, the most turbulent, unpredictable area will be the Economic area, while the most stable shall be the International area.

In the Political and legal area, the fewest number of opportunities with a strong positive impact have been identified, and in the International area the most threats with weak negative impact can be observed.

Taking into account the data included in Table 5, it can be concluded that in the Assistive technologies sector for the digital inclusion of persons with disabilities and elderly people, negative phenomena in the analyzed period of 5 years are basically not predicted. In all areas of the global environment analyzed by the scenario method, almost 100% of the elements are assessed as opportunities. The exception is the Growth of Development of Health Technologies from the Technological Area, which may be a serious threat for this type of activity.

Taking into account the data included in Table 5, it should be noted that most of the so-called key processes, characterized by the highest probability and very high impact factor, can be identified in the Technological area. Moreover, all key processes have been identified as opportunities.

Table 5. The most likely scenario - trends which occurrence is the most likely – the "negative" and "positive" impact of the digital inclusion of PWD

The elements of scenario	Most likely	Negative	Positive
Economic area			
Stabilization of economic situation in Europe (GDP per capita)	0,70	-	+1
Growth of vocational integration of persons with disabilities (unemployment rate of PWD)	0,50	-	+5
Growth of amount of public funds for social integration for persons with disabilities, including tax reduction due to expenses for rehabilitation (Euro)	0,50	-	+5
Growth of mobility of persons with disabilities and their assistants or carers (number of European Mobility Cards)	0,60	-	+5
Growth of sale of Assistive Technologies ICT devices	0,50	-	+5
The average impact factor	**-**	**-**	**+ 4,2**
Technological area			
Growth of development of information and communication technologies for digital integration of persons with disability (number of AT ICT devices launched)	0,8	-	+5
Growth of new assistive technologies devices more attractive: lighter, safer, stronger, easier to use (number of new AT launched)	0,7	-	+5
Growth of development of medical technologies compensating disabilities-health science	0,75	-1	-
Growth of availability of ultra-fast broadband internet	0,8	-	+5
Growth of innovative ways of transmitting and receiving digital information	0,7	-	+5
The average impact factor	**-**	**-1**	**+5**

Social area			
Growth of population of people with disabilities	0,65	-	+3
Growth of population of elderly people: 65 plus	0,85	-	+4
Growth of educational integration of persons with disabilities and elderly people in education, (e.g. third age universities)	0,60	-	+4
Growth of persons with disabilities and elderly people enjoying recreational and tourist services	0,70	-	+4
Growth of persons with disabilities participating in social and vocational rehabilitation (participants in occupational therapy)	0,50	-	+3
The average impact factor	**-**		**+3,6**
Political and legal area			
Growth of proportion of PWD in municipality councils and local authorities offices and departments	0,5	-	+4
Growth of laws, resolutions and ordinances of public bodies, supporting persons with disabilities.	0,5	-	+3
Growth of representation of disabled people in local self-governments (Number of plenipotentiaries of PWD in local governments)	0,7	-	+3
Growth of advocacy for the rights of people with disabilities (Number of social organizations fighting for the rights of PWD	0,7	-	+3
Growth of availability of electronic voting procedures (number of European countries having the electronic voting procedures available)	0,7	-	+5
The average impact factor	**-**		**3,6**
International area			
Growth of number of countries complying with the rules of United Nations Convention on the Rights of Persons with Disabilities (CRPD	0,7	-	+2
Growth of implementation of Directive (EU) 2016/2102 of the European Parliament and of the Council of 26 October 2016 on the accessibility of the websites and mobile applications of public sector bodies (countries with full implementation of directive)	0,7	-	+3
Growth of accessibility of websites and mobile applications - number of websites and application complying with WCAG standards in business and civic sector	0,6	-	+3
Growth of cooperation in the field of social integration, including digital integration between organizations from different countries; exchange of good practice in field of digital inclusion (Number of international projects on disabilities)	0,6	-	+2
Growth of establishing international funds for people with disabilities	0,5	-	+3
The average impact factor	**-**	**-**	**+2,6**

Source: own studies, 2019

Conclusions

The analysed sources and legal documents regarding the role of AT and digital inclusion for the social integration of persons with disabilities allow to formulate the following trends:

- the European Union continues to shift to a knowledge-based economy and that is why digital inclusion is becoming a priority area for policymakers at every level of government. However, equitable access to digital technology is no longer enough. Digital life requires that users are nowadays as much content creators as they are content consumers.
- Despite the increasing availability of assistive technology devices, they are often paid for by individuals and families out of their own pocket rather than by the contribution of third parties. People in a difficult economic situation are more likely to have an unmet need for as Assistive Technology device mainly because they cannot afford to buy them.
- Due to the multiplicity of jurisdiction systems, a person with a disability arriving in a given country often does not have access to facilities that are used by its residents with the same disability. For example, a blind citizen of one country, visiting his blind friend in another country, must pay the full price for the ticket, and his host bears half of these costs or does not pay them at all. Therefore steps have been taken at the international level to harmonize activities for people with disabilities.
- The aging of population is contributing to an increased number of Assistive Technologies, but there are other factors contributing to this increase, such as: the reduced costs of technology, improved and increased attractiveness of design.
- The introduction of Industry 4.0 - the concept of creating an interactive network between production and the digital sphere. As a consequence of the development of industry 4.0, there will be many structural changes in the world of work, including the vocational integration of people with disabilities. The effects of these changes for people with disabilitiesare difficult to predict at the current time.
- From the point of view of employers and people with disabilities, the future is less than certain; but from perspective of the Assistive Technologies' sector, the results of the analysis featured here show great opportunities in the development and use of AT products.

■ Chapter 5 ■

Recent Changes in Consumer Behaviour and Marketing Activities

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Abstract: This study aimed to analyse the relationship between consumer behaviour and new trends in the market environment. The author presents here various approaches to defining consumer behaviour in the context of the dynamic changes in the market environment and makes an attempt to answer the question to what extent new phenomena in consumer behaviour, such as New Balance and Normcore, influence the present-day consumer behaviour. The study makes use of research focusing on secondary sources performed using the desk research method and participatory observations. Among other materials used were secondary sources, results of quantitative studies performed with the use of the CAWI method, individual in-depth interviews and focus group interviews. The research focused on new trends in consumer behaviour and its major motivators.
Keywords: consumer, consumer behavior, marketing

Introduction

The consumer, viewed as an active participant in market processes, can be defined in various ways. From the economic perspective, the consumer is described as "the end link of the economic process from the producer's manufacturing of a product to its purchase by the person who is going to use the product, consume it or use it repeatedly, without regarding it as a good suitable for further trading but a good which is to benefit the said person or their economy" (Łętowska, 2001, p. 83). In the literature on the subject, the notion of the consumer is also interpreted as "an economic entity declaring

demand for goods that meet its needs" (Bekasik, 2001, p. 44). This article aims to analyse the relationship between consumer behaviour and new trends in the market environment. Various approaches to defining consumer behaviour were presented in the context of dynamic changes in the market environment and an attempt is made to answer the question to what extent new phenomena in consumer behaviour, such as New Balance and Normcore, influence the present consumer behaviour. The study makes use of research based on secondary sources carried out with the application of the desk research method (results of quantitative studies performed with the use of the CAWI method, individual in-depth interviews and focus group interviews). Own participatory observations were also used. The research focussed on new trends in consumer behaviour and their determinants.

Materials and methods

The notion of the consumer comes from the Latin word *consumens* and means "the purchaser of good for own use, the user of goods" (Opaliński, 2002). The notion of the consumer, even when narrowed down to the socio-economic aspect, is an extremely broad term and is in the range of interests of numerous scientific disciplines, including management, economics, psychology and sociology. Each of them presents several approaches to the definition of the consumer, which contributes to the lack of uniformity of the terminology used. The Civil Code defines the consumer as "any natural person who performs acts in law which are not directly connected to his or her economic or professional activity" (the Act of 23 April 1964 – the Civil Code, Journal of Laws of 2014, item 121, Article 22, as amended on 25.12.2014). Another interpretation of the term in question can be found in the Act on consumer rights (the Act of 30 May 2014 on consumer rights (Journal of Laws of 2014, item 827, as amended). The Act defines consumer sales as "the sales of movable property carried out within an enterprise's activities to a natural person who purchases the property for a purpose unrelated to their professional or economic activities (consumer goods)". The adopted statutory provisions make it possible to define the consumer as a natural person purchasing goods for their own private use. It should be pointed out that services are not mentioned in the Act (only "objects", "consumer goods"), and the same applies to natural consumption (self-produced goods) and social

consumption (good received free of charge in the form of benefits (Gąsior and Skowron, 2013, p. 11).

The subject matter of consumer behaviour is being investigated both in the Polish and foreign literature. Publications on consumer behaviour pertaining to the consumer goods and services market which broadly discuss the subject matter include those by K. Mazurek-Łopacińska (Mazurek-Łopacińska, 2002, p. 112, Mazurek-Łopacińska, 1997, p. 23), J. Kramer (Kramer, 2006, p. 45), E. Kieżel (Kieżel, 2010, p. 29), L. Garbarski (Garbarski, 2001, p. 89), L. Rudnicki (Rudnicki, 2011, p. 203-213, Rudnicki, 2000, p. 36) and G. Światowy (Światowy, 2006, p. 57).

The analysis of consumer choices helps businesses interpret their perceptions and all possible interactions between consumers. In the literature there are numerous definitions of "consumer behavior", which can be understood as (Falkowski, and Tyszka, 2006, p. 12):

- "All activities associated with the obtaining, using and disposing of products and services, including decisions preceding and conditioning these activities" (according to R.D. Blackwell, P.W. Miniard and J.F. Engel).
- "A way of prioritising consumer needs, a way of selecting goods and services to satisfy the needs and a way of consuming goods" (according to M. Pohorille).
- "All activities and perceptions of consumers contributing to product selection decisions as well as actual product selection and consumption" (after F. Hansen).
- "All objectively and subjectively defined, rational and emotional, conscious and unconscious actions during the preparation for making a decision on the consumer goods market and at the time of consumption" (according to H. Fabiunke, H. Fisker, J. Jager, W. Kopert).
- "…everything that happens before, during and after a consumer purchases goods and services" (after A. Falkowski, T. Tyszka).

A broader approach to consumer behaviour is presented by G. Antonides and W.F. Van Raaij, defining consumer behaviour as: "mental and physical activities (of individuals and small groups), including their motives and causes, related to obtaining information about products as well as product purchase, use and disposal from the market or the public sector and the household, enabling consumers to achieve their goals and make their values a reality (taking into

consideration individual and social effects and consequences) in order to achieve satisfaction and well-being" (Antonides and others, 2003, p. 24).

Conclusions

Contemporary models aimed at explaining consumer behaviour process are the result of research in the field of psychology, economics, sociology and marketing. Initially consumer behaviour theories postulated that decisions were fully rational and motivated solely by economic factors. The utility theory developed by W.S. Jevons (Jevons, 1871), C. Meneger (Meneger, 1874) and L. Walras (Walras, 1874) assumed that an individual aimed at achieving maximum profit with minimum expenditures and sacrifice. The concept was modified by H. J. Davenport, P.H. Wicksteed, F.A. Fetter and F.H. Knight (Gąsior and Skowron, 2013, p. 15). The pioneering theory by G. Katona included rational behaviour, but pointed out that it applied only to some purchases (Gąsior and Skowron, 2013, p. 16). G. Katona assumed that consumers acted with limited rationality and were not able to maximise satisfaction because they did not know all the choice variants (Gąsior and Skowron, 2013, p. 16).

However, current changes in consumer behaviour in developed countries are profound. They are so clearly visible that the notion of new consumption has been coined (Bywalec, 2007, p. 137). These changes refer not only to the hierarchy of needs and the level and ways of fulfilling them but to a greater susceptibility to external influence. These phenomena have manifested themselves in increased consumption as the main purpose of social life, a form of integration between individuals, a source of pleasure, self-satisfaction and distinction. In developing and transforming countries, there are clearly visible tendencies to follow the described consumption patterns, which are often adopted in an uncritical way. A factor conducive to these processes is the intensification of international relations and contacts, for instance through social media, whichallow the new consumption to spread freely.

The New Balance generation is balancing on the verge of the commonness and ordinariness of exceptional brands which are recognised by few. The balance in this case is very difficult to find.

Normcore is a group of people with a fashion awareness, which is the main reason for them to intentionally impose certain restrictions on themselves. This does not mean that Normcores negate the familiar symbols

or brands, but that they intentionally choose those brands which are very discretely labelled and non-ostentatious. For instance, the described group of people wears brand jeans which look old-fashioned. The group also includes people who actually wear old and used items of clothing, but in combination with a very expensive bag which also looks old. The stylisation of Normcores is based on a reflection of what they wear, where they buy their clothes and what materials these clothes are made of. They do not focus on brand symbols but on the content of the overall package – where it comes from, who made it and in what conditions, etc. For Normcores the ethical choice is important. They require products to offer top quality, comfort and durability – they need to last for years. The Normcore movement seems to show great sentiment for normality and truth (Bierca and Wysoka-Świtala, 2015).

Normcore is a carefully considered attitude, and is most clearly visible in the fashion and accessories industry and also on the interior design market. For Normcore groups, quality and durability are essential. People representing the Normcore trend are tired of constant activity on Facebook. The point of reference for Polish Normcore people are western countries. Like in those countries, they shop online. The favourite brands of Normcore people are Gapa, Uniqlo, COS, American Apparel and Urban Outfitters, among others. In western countries, the Normcore trend is much more prominent. In societies with saturated consumption levels (where both earnings and living standards are much higher than in Poland) people more often present the described attitudes. In Poland it is possible to notice strong aspirations. Affluent customers often expose their status by buying an expensive watch or a bag. Only a small group of people has sufficient awareness to keep their style discrete and choose quality brands.

At the 16th Congress of Market and Opinion Researchers the following research questions were posed (Report from the 16th Congress of Market and Opinion Researchers, 2015):

- Why do consumers from the New Balance generation need to be "ordinary"?
- Is Normcore a temporary trend or a reflection of deeper needs and a greater awareness?
- What does "ordinariness" say about consumers?
- Are there brands supporting this "ordinariness" and what is their potential?

In order to verify the research questions, a quantitative study was performed using the CAWI method among residents of five large Polish cities aged 20-35 years (n=628, August 2015), along with individual in-depth interviews with exponents of the Normcore trend. The starting point in the analysis and characterisation of the New Balance generation were the values appreciated by them, such as balance, comfort and truth (Bierca and Wysoka-Świtała, 2015).

The need for balance presented by consumers arises from an excess of stimuli, and treating normality as luxury. New Balance people, whereas, are looking for tranquility and respite from the everyday. They prefer simple forms, are considerate and appreciate the classics.

As many as 65% of New Balance people chose their clothing based on the criterion of comfort and 59% did not like to be judged by their looks, style or clothing. The need for comfort of the New Balance generation results from their being tired of the multitude of trends and the dominance of branded products, as well as the pressure for looking perfect. This need is fulfilled by seeking comfort instead of style, choosing quality products and minimalism, and having a slightly blasé and nonchalant attitude. Almost 80% of the Normcore group believed that the product itself was more important than the brand (quality, performance, comfort). More than half of the respondents were tired of people parading in popular branded clothes and considered it a sign of snobbism and a forced attempt to emphasise one's social status. The New Balance consumers' need for truth originates from their opposition to the triumph of form over substance and their demand for honesty. It is manifested in behaviour focusing on authenticity, naturalness and anti-snobbism, without exposing brand symbols, and respect for materials and the making process.

Conclusion

Changes in consumer behaviour directly influence the marketing activities of enterprises. The fact that Normcore rejects clearly visible brand symbols and chooses brands which do not flaunt their symbols; or do so in a discrete way, is a sign for entrepreneurs to modify both their products and their promotional strategy. Normcore consumers choose seemingly used, simple and comfortable items.. In this way the Normocre group creates an impression of apparent ordinariness.. It can be stated that Normcore "winks" at those acquainted with the idea and stimulates a trend originating from the need for

anti-creation, naturalness, etc. This fact determines changes in the remaining tools used in the marketing mix as well as in the choice of promotional measures and forms.

To recap, consumer behaviour is one of the major factors determining the activities of each market enterprise. The precise recognition of consumer behaviour may bring lucrative profits to enterprises, as well as a competitive edge over other market players resulting from a better adjustment of their range to customer expectations. The knowledge about consumers, their needs, market decision mechanisms and patterns of behavior, continues to be the basis for business operations in a dynamic market economy. These are consumers who determine the success or failure of an enterprise. From the perspective of an enterprise, consumers are the main source of uncertainty, which is why their behaviour requires ongoing research.

■ Chapter 6 ■

Logistics and the Management of Information Flow

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Abstract: Information flow is a crucial component of activities in the logistics area. Each flow of raw materials and goods is also accompanied by the flow of information. Unlike the movement of goods, the flow of information is always two-directional. Information flow is a necessary guarantee for the movement of goods in the economy. Additionally, information which is passed at the end of the logistic process is a confirmation of the delivery. The aim of this study is the presentation of conditions referring to the management of information flow in different aspects of logistic activities. The flow of information in logistics supports the collaboration between a supplier and a recipient of goods, it connects individual links in the supply chain. As there is the need for efficient and quick transfer of all information available in an enterprise, cutting-edge information systems are commonly used in each of the areas of logistic activities. Contemporary IT solutions applied in the area of logistics help to increase the process speed and information accessibility. Logistics is a type of activity which shows in this scope great willingness and effectiveness of the implementation of innovative solutions.
Keywords: management of information flow, delivery, innovative solutions, logistic activities, Internet of Things, Artificial Intelligence

Introduction

Information flow is a crucial component of activities in logistics. The appropriate exchange of information between the sender and the recipient is the key condition for moving goods between their dispatch and reception point. Each flow of raw materials and goods is also accompanied by the flow of information.

Unlike the movement of goods, the flow of information is always two-directional. Information flow is a necessary guarantee for the movement of goods in the economy. Following this, the role of information consists in anticipating the movement of goods and accompanying it in an explanatory manner. Additionally, information which is passed at the end of the logistic process is a confirmation of the delivery itself.

The process of information interchange begins earlier than the process of the exchange of goods. The appropriate interchange of information between the sender and the recipient is the key condition for the movement of goods between their point of dispatch and delivery. It is reflected by, among other things, the need for sending a quotation to a prospective buyer and receiving in return a reply in the form of an order for specific goods. Thus, the flow of information also initiates the movement of goods. Usually, the exchange of goods is also accompanied by an exchange of information which refers to e.g. the current location of a given consignment or information on damage to or delay of the delivery, if any (Gołembska, 2006).

The flow of information in logistics supports the collaboration between a supplier and a recipient of goods, i.e. it connects individual links in the supply chain. Efficient information flow also plays an important role internally, contributing to the connecting of further spheres of organisation activities. It enhances communication between the purchasing and production departments as well as between the production and distribution departments. Therefore, in simple terms, it may be stated that information flow is a kind of a nervous system of logistics as it ensures the efficient command of all processes in an enterprise (Blaik, 2010).

As there is a need for an efficient and timely transfer of all information available in an enterprise, cutting-edge information systems are commonly used in each of the areas of logistic activities. Today's information and communication technologies are regarded as an indispensable component of a broader logistic systems infrastructure. The development of information technology has become an indispensable component of the appropriate implementation of assumptions relating to the functioning of logistic systems (Christopher, 2000).

Information as a factor supporting the management of a supply chain

The scope of collaboration between enterprises with reference to the logistic activity has been subject to numerous changes and improvements. At first, the collaboration on the enterprise - customer level was based solely on the execution of the delivery of a given product. Only subsequently, did the cooperation between enterprises and customers started to align to a greater extent. As a result, individual stages of enterprise activity, including purchasing, production, distribution and other back-office operations within the enterprise, has been technologically combined (Porter, 1998).

The consequence of such an approach was the claim that the success of an enterprise can be achieved by way of the efficient collaboration among all entities cooperating with an organisation. Newly-shaped relationships were based on a number of connections which were later referred to as supply chain links. It is worth noting that at the initial stage of the forming of the collaboration between enterprises, businesses strived for reduction of stocks; however, very soon, they also began to optimise other processes linking individual contractors. This was possible due to the streamlining of the exchange of information and to the technological advances taking place in this scope.

There are a number of different approaches in the scope of the identification of the supply chain. For the European Committee for Standardisation, a supply chain is the sequence of processes which create value added to a product during its flow and processing from raw materials through all intermediate forms to the form consistent with the requirements of the end-client (Logistics – Structure, 1997). According to the APICS (Association for Operations Management), relationships between the supplier and recipient, their solidity and mutual trust, are essential for the functioning of a supply chain (Cox, Blackstone, Spencer 1995).

The supply chain can also be referred to as a process or a structure. As a process, it is a sequence of events in the movement of goods which increases their value. The supply chain, referred to as a structure (organisation), is a group of enterprises performing together activities which are necessary to meet the demand for specific products in the entire chain of movement of goods stimulated by the flow of information.

We may usually distinguish the following in the structure of the supply chain:

- an initial link, which is a supplier providing a producer with raw materials and consumables,
- indirect links responsible for processing which results in the manufacturing of finished goods,
- a final link which is an enterprise supplying a customer with a product.

The supply chain may have the following nature:

- external – it is formed by independent enterprises which strive for a common goal,
- internal – it is formed by functional units within one enterprise.

The supply chain may refer to:

- one enterprise, together with its internal suppliers and recipients,
- a pair of collaborating enterprises, in a supplier-recipient relationship,
- numerous enterprises collaborating in a supplier - recipient relationship.

In a structure defined in this manner, a supply chain means mining, production, trade and service companies as well as their customers and clients collaborating in different areas. Between them, there is a flow of streams of products, information and financial means (Kawa, 2010). Apart from the three components mentioned above, more and more attention is being paid to the exchange of knowledge. Summing up, the types of streams mentioned here constitute the basis for each of the logistic activities.

Current business practice indicates that the majority of enterprises have numerous suppliers and recipients acting to achieve one goal - providing an effective service to the end consumer. In reality, this comprises the entire supply network where we may distinguish a series of individual chains.

On the one hand, the supply network is a type of a configuration of the supply chain where some of the links are multiplied so as to deliver different products to the points of production, distribution or sale. On the other hand, it is a collection of enterprises collaborating with the recipient so as to meet their needs regarding production, distribution and sale (Niestrój, 2004).

Within the supply chain there is often a business entity having a much-privileged position. The supply chain leader is an enterprise holding a dominant position as compared to other business entities. It is this enterprise that imposes the manner of functioning on other entities. At present, retail networks play the role of such leaders.

A network organisation is regarded as a group of enterprises, linked with a computer network, whose main objective is increasing the effectiveness of decision-making processes (Wiatrak, 2003). We may enumerate the following features which distinguish a network organisation:

- liquidation of borders between network participants (nods);
- the community of goals and the resulting high level of mutual trust;
- a low level of vertical integration and hierarchy between participants having as diversified as possible a set of resources and competence;
- the ability to learn, innovativeness and flexibility;
- information transparency through the application of advanced information and communication technologies.

Due to the need for the efficient and timely transfer of all information available in an enterprise, modern-day logistics operating within the supply chain are looking to cutting-edge information systems. The development of information technology has become an indispensable element of the proper realisation of assumptions relating to the functioning of logistic systems. Information and communication technologies available nowadays are regarded as an indispensable element of a broad logistic systems infrastructure (Fechner, Szyszka, 2018).

Information systems used in logistics perform the following functions:

- an initiating function - a series of actions connected with the processing of orders and the creating of necessary documents which goes back to the supply chain;
- a planning function - logistic processes seen in different cross-sections and various time spans; in this case, one of the key areas is planning of material needs in an enterprise, preparation of production schedules or planning of distribution of goods;
- a coordinating function - all actions, processes and operations taking place in the logistic system; this function is applied both in the environment of one enterprise and with reference to the entire supply chain; the coordinating function is performed with reference to time,

place and quantity, and it is also tightly linked to the need for communication;
- a control function - the performance of logistic operations, mostly in production, storage and transportation processes;
- a steering function - the operating sphere and all logistic processes, especially with reference to production, storage and actual distribution;
- an integrating function - integrating the information system of an enterprise with the systems of suppliers, business partners and recipients, which enables communication between various links of the supply chain (Szymczak, 2013).

So as to streamline the flow of information and goods within the supply chain, electronic interchange of documents was introduced, which is a natural next stage for the automated product identification which takes place in computer systems. Electronic Data Interchange (EDI) allows placing orders, preparing documents and issuing confirmation of shipment receipts owing to the use of readers and the application of computer systems. This system is based on international standards in the scope of communication and information interchange.

Electronic Data Interchange – as the support for logistic processes

The introduction of electronic document interchange is an obvious consequence of automated product identification in computer systems. The idea behind EDI consists in the combination of opportunities offered by information and communication technologies so as to eliminate the need for creating hard copies of documents. EDI is the simplest technology serving the purpose of carrying out business transactions without all the labour-intensive activities of creating, copying and sending of documents. It is one of the modern solutions combining directly the functionality of information systems with the minimum input of human work.

EDI is an electronic system of transmission of business data and other documents from computer system or database owned by one organisation to a computer system or database owned by another organisation. All documents referring to the placing and processing of an order, such as an order confirmation or an invoice, do not have to take the form of computer printouts. The application of proper computer structures makes it possible to send documents to a computer system where they are decoded and entered

into a computer file. A recipient does not have to get involved in any way, whereas the involvement of a sender is minimal.

Also, users operating within EDI do not have to own the same computer systems. The only requirement for them is to have applications enabling recording and reproducing of electronic structures. The assumption of this system distinguishing it from all others is the lack of human input throughout the entire process of data transfer, which is not possible with the use of popular drives. While speaking about EDI, it should be considered mostly as automated data processing and transfer.

The application of EDI in the area of logistic activities enables the immediate information transfer to business partners. The system uses standard commands which means that all users taking part in the information interchange use the same language. Using the EDI makes it possible to combine processes taking place within the external logistic chain and guarantees the control over the processes being currently performed.

An important achievement, aided by the use of EDI, has been the elimination of the need for the multiple entering of data and the possibility for information to flow efficiently and timely between the participants taking part in the interchange. The use of EDI shortens the time needed to access information and reduces the labour-intensiveness of the process. For the application to bring quantifiable benefits, all participants in the logistic channel should communicate with the use of a computer system. The effective implementation of the system means that all computer systems, both those of buyers and sellers, need to communicate directly.

The main grounds for the application of EDI is the globalisation of trade transactions enforcing the agreement on a worldwide standard of documents, the development of computer technology and the reduction of the costs of its application. EDI is an interface for sending documents which are most important for seller such as invoices, correction invoices, delivery notes, settlement reports and inventory reports. It significantly facilitates the interchange of information.

Information systems streamlining transport management

Contemporary transport companies operate in fast-developing local, national and international markets, where competition is fierce. The requirement to maintain customers and acquire new ones forces many businesses to improve

the quality of their services and to strive to meet the needs of their customers in the best possible manner. In turn, the pace of changes occurring in the environment of a contemporary enterprise requires more and more efficiency in operations (Bojarski, 2003).

The growing dynamism of the business environment has led to an expectation that IT tools will reduce the time needed between the identification of new needs andthe meeting of the same, which poses new challenges for transport companies. Now, the attention of every transport company is focused more and more on logistics management tools; and a prerequisite for effectiveness and the achievement of business objectives is having a smoothly functioning IT infrastructure.

The integration of all processes occurring in a business entity by means of direct access may be achieved by way of the application of a constant connection to the network and the use of proper software. Production, distribution and purchasing processes, financial records and cost control means are processed consistently in real time, or immediately after the occurrence of an event (Gołębowska, Szymczak, 1997).

The flow of information in transport and forwarding companies is more important than ever before. It forms a kind of a nervous system integrating links in the supply chain. It enables smooth steering of transport and forwarding processes, which facilitates the making of right decisions based on the provided, previously processed, information. With an increase in the the range of manufactured goods, and the expansion of businesses, the mass movement of goods is taking place. Thus, it is necessary to use modern information and communication technology so as to process the vast amounts of information which accompany this movement (Długosz, 2009).

Organisational changes in transport and forwarding companies are integral to the development and extension of information systems. Information forms the basic material for planning, decision-making and preparation of analyses based on generated business results. The information system supports decisions of the management and becomes an indispensable tool in day-to-day operations of transport companies.

Transport, as a tool serving all kinds of movement, is a key link in the logistics system. Streamlining this link, which directly conditions an increase in the efficiency of the entire logistics system, requires multilayer actions. The Computerisation of transport in a broad sense means the application of electronic communication networks, electronic data interchange techniques,

the implementation of bar codes and the paperless workflow of documents. This computerisation, facilitating transportation tasks, is a means leading to the gaining of a competitive advantage..

Transport units when realising the transport process often pass through numerous indirect links - a supplier, a recipient, one or more intermediaries, transshipment points, customs etc. In each of these links, it is necessary to identify these units so as to attribute to them information such as the specification of a supplier, a recipient, the content of the unit, weight, etc. This information is often stored in computer systems and may be interchanged between parties involved via the EDI.

A new functional quality of contemporary systems for information flow management results from their useful applications. Strong, both horizontal and vertical integration of individual market players is also of key importance. As a result, from the point of view of a user, it leads to the need for having instant access to a wide set of applications, to new computer technologies and hardware platforms. The protection and security of IT investment and of data transferred within the systems becomes a new challenge.

IT solutions used in transport enable full integration with clients, allow a company to be closer to its business partner, to integrate with his IT environment and to supply all necessary information on his carriage. Apart from the EDI, Track&Trace mobile application occupies an important place among solutions widely used by businesses. It enables tracking cargo online. Owing to the integration with a GPS transmitter of forwarding agents, contractors receive information on the location of a vehicle directly from a satellite.

Another example of the application of IT solutions is electronic freight exchanges. They enable a forwarding agent to track new offers submitted for transport. The exchanges have gained great popularity as they are easily accessible. In most cases, there is no need for interference with the participant's information system. Online logistic markets act as intermediaries in the interchange of information on demand for logistic services and options to satisfy this demand, using enterprises from the transport, forwarding and logistic industry which participate in auctions. The main activity of e-markets consists in matching the offers of the platform clients within one or many logistic processes. However, most often, it is transport that is involved as well as proper functioning of the mechanism of an auction as such. An enterprise

chooses groups of operators considering the requirements indicated by its clients and then offers for the rendering of a service are placed.

Depending on their range, electronic exchanges may divided into local, national, European and international ones (Pędziwiatr, Kaczmarek, 2018). Another classification distinguishes open and dedicated freight exchanges. Open platforms are meant for all entities that are interested in taking part. An enterprise accomplishes specified formalities and becomes a member of an e-exchange. Customers of such a platform are small and medium-size transport enterprises which have a fleet of 5-10 vehicles. It is the largest group of users of freight exchanges. Another extremely important link is forwarding companies, where day-to-day operations are impossible without participation in electronic freight exchanges. Forwarding agents usually use several exchanges at the same time so as to manage their transport fleet effectively (Kisielewski, Leśniakiewicz, 2016).

An electronic freight exchange is an ideal tool to increase the transport efficiency ratio, i.e. to use the space of the hold while meeting full transport orders. Then, the user may browse catalogues of suppliers, competitors, as well as its clients, at any time, creating transport environment independent of time zones and distances separating partners (Sosnowski, Nowakowski, 2015). Based on forwarding agent's current orders and information on his cargo, the system selects and offers to the forwarding agent new orders to be carried in the opposite direction. It considerably helps to reduce the costs of transport. As part of another function, a forwarding agent has an opportunity to check payment status and to print out a transport order. An important tool is also GetRate online calculator, which allows calculating in real time the cost of sending cargo from China to European countries via container rail transport.

A solution which comprehensively streamlines the process of transport order management is Oracle Transportation Management (OTM). It allows shippers to organise order processing and to streamline it, to check time devoted to order execution, to control the budget, to facilitate communication with customers and subcontractors, to build a knowledge base on customers and to settle individual orders automatically.

For large transport companies, which put their own development and an increase in the information flow between their employees and clients in the first place, CRM (Customer Relationship Management) and ECM (Enterprise Control Management) seem to be indispensable systems. Companies which are not using these systems are not able to compete with others in terms of

availability for a client and continuous communication between employees. With today's standards which clients have got used to, i.e. almost immediate reply to their queries, quick payments and availability of goods within not more than 24 hours, a company without the support of one or two systems cannot meet these requirements. Tools and strategies offered by these systems make it possible to manage information irrespective of its location, which allows businesses to consolidate all information from the area of logistics.

Conclusions

Contemporary IT solutions applied in the area of logistics help to increase the process speed and information accessibility. The intense development of technology and systems means that what was an innovative customer service only five years ago becomes a standard procedure nowadays. The service of in-route monitoring of cargo is just such an example. This is an intensely growing trend. The more information is gathered about the transportation of cargo, the more detailed is our anticipation of its flow and the efficiency of such transportation. It makes it possible for employees to save time dedicated to performing routine activities and to reduce the cost of downtime in transport resulting from inappropriate planning of delivery routes.

In the coming years, artificial intelligence (AI) may substantially change the process of information flow. Self-teaching algorithms, which are driven by more and more digital data provided by computers and home appliances, cars and devices plugged into the Internet of Things (IoT), will support us in our daily activities. Advances in the scope of machine learning, artificial neuron networks or computer vision mean that technology is no longer an obstacle to the implementation of AI. Then, the barrier is the readiness of the market, of the legal system and of society to implement innovative technologies and the related changes in the functioning of specified industries. Logistics is a type of activity which shows in this scope great willingness and effectiveness of the implementation of innovative solutions.

■ Chapter 7 ■

IT Systems Supporting Warehouse Management in the Supply Chain

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Abstract: In the present-day situation, various IT systems are used for the management of storage area, location of goods and registration of warehouse turnover. Customers want to receive their goods in a faster and faster manner, and the number of orders is increasing together with the development of the e-commerce industry.IT systems undergo a constant makeover. Owing to the development of information technology and process automation, it is possible to handle a larger number of warehouse transactions without the need for increasing the number of staff. This study aims to present the role and importance of IT systems supporting warehouse management in the supply chain. We analyze in detail the role and place of a warehouse in the logistics supply chain, factors shaping changes in the storage area market in Poland, major IT systems facilitating communication within the warehouse and its environment. The final section of the study indicates the directions of changes in the scope of warehouse processes computerization and automation. Owing to automation, robotics, artificial intelligence and other advanced technologies, a modern WMS is the software which is capable of handling the majority of distribution operations. It makes inventories visible and it integrates with transport management systems and with other solutions to streamline the movement of goods from a producer to a warehouse, and then to a retailer and finally to an end-customer.
Keywords: IT system, warehouse management, supply chain, e-commerce industry, automation warehouse processes

Introduction

In the present-day situation, various IT systems are used for the management of storage areas, the location of goods and the registration of warehouse

turnover. They provide information about stock levels and facilitate the completion and preparation for shipment of a new batch of goods. The development of IT systems follows the evolution taking place within the supply chain (Adamczewski, 2001). Customers want to receive their goods in an ever-faster manner, and the number of orders is increasing together with the development of the e-commerce industry.

Contemporary businesses need to catalogue a diversified range of products. In many warehouses the number of warehouse units identifiable with a unique code dedicated to a given product amount to tens of thousands. Without efficient warehouse management systems, this would be an impossible task (Długosz, 2009).

IT systems are undergoing a constant makeover. Servicing multi-stage processes which occur during warehouse operation time requires the systems to display versatile functions. As a result, these systems support the management of further phases of warehouse processes such as the logistics of incoming and outgoing materials, the logistics of returns and claims, or the management of stocks and storage area. Additionally, IT systems managing the work of a warehouse need to have the ability to communicate and cooperate constantly with the company supply, the production and distribution systems, and to have convenient tools to manage personnel productivity. Owing to the development of information technology and process automation, it is possible to handle a larger number of warehouse transactions without the need for increasing the number of staff (Skowronek, Sarjusz-Wolski, 2012).

This study aims to present the role and importance of IT systems supporting warehouse management in the supply chain. We analyze in detail the role and place of a warehouse in the logistics supply chain, factors shaping changes in the storage area market in Poland, the major IT systems facilitating communication within the warehouse and its environment. The final section of the study indicates the directions of changes in the scope of warehouse processes in terms of computerization and automation.

The position of a warehouse in the supply chain

A warehouse represents an important component of the supply chain. It is described as a functional and organizational unit designated for the storing of material goods (inventories) in the designated area of a storage structure; storing inventories, raw materials, semi-finished products and goods which are

temporarily not in demand (Bendkowski, Radziszewska, 2011). Material goods need to be stored using appropriate methods and kept in proper storage conditions depending on individual physical and chemical characteristics of specific goods.

In the supply chain, a warehouse constitutes the key link combining the purchasing activity with the production and the market (Ciesielski, 2009). Its function is taking temporary storage and the transfer of goods momentarily, not moving to further links of the trade. Irrespective of its location within the organizational structure of an enterprise, we may distinguish two main functions which a warehouse performs: the inventory protection function, which is static, and the manipulative function, referring to the time of entries and withdrawals of the goods, the waiting time in loading. The time it takes to perform these actions affects warehouse efficiency. This is because the manipulative functions are characterized by high dynamics.

Logistic processes aim to guarantee the highest possible level of customer service at the lowest possible costs (Grzybowska, 2010). That is where various types of modern stock management strategies directed at reducing company costs through the cutting of inventory levels, without decreasing the standards of customer service, come into play. However, fast-changing demand and costs, which companies are exposed to as a result of lack of stocks, make it impossible to eliminate the storage process (Ciesielski, Długosz, 2010). Thus, storage areas remain one of the major links in the logistic process for each business entity.

To meet the constantly changing requirements of the market, production, trade and service enterprises are forced to maintain stocks which will ensure an uninterrupted production process and the appropriate level of customer service. In this area, functions relating to warehouse management and proper stock management are of key importance (Fertsch, 2006).To this end,, the realization of activities performed in the logistic process: the organization of storage tasks, the warehouse staff management as well as supervision over storage tasks, becomes particularly important. The efficient functioning of a warehouse within the enterprise structure has a significant effect on the level of costs, the number of stocks held, the efficiency of material flow, as well as the level of organization of the enterprise.

The market for the modern warehouse storage area in Poland

Poland holds the third position in the list of European locations most frequently chosen to set up or to transfer to a warehouse. Only the Netherlands and the largest European marketof Germany are ahead. of Poland. Further positions are taken by France, Russia, Spain and Italy, respectively. Every tenth metre square of storage space in Europe is rented in Poland (Olszewski, 2019).

The development of modern storage facilities is occurring in Poland at a faster pace than that seen in other Central and East European countries. The first facilities of this type started to appear as early as in the first half of the 90s. Then, developers and investors focused on Warsaw and its nearest regions. The situation changed in 2004-2005 when Poland's accession to the EU triggered a sudden growth of industrial investments. When the demand was growing, developers were more willing to start investments also outside Warsaw. After Lehman Brothers went bankrupt, the supply of new storage space slowed down. Then, developers limited their speculative investments and started to opt for the hedging of earlier rent agreements. As early as in 2010 there was again stable growth, and starting from 2014 we have been witnessing spectacular increases in the supply.

As at the end of March 2019, the total storage space in Poland amounted to 16.3 sqm. 2.14 sqm of storage space is still under construction as part of 72 projects (Marketbeat - Polski rynek magazynowy - I kw. 2019, a record high in developer activity recorded as at the end of the first quarter. We may distinguish four markets in terms of the scale of new investments. These are Upper Silesia (568,000 sqm, 13 projects), Central Poland (454,000 sqm, 10 projects), Wroclaw (221,000 sqm, 8 projects) and Warsaw- the neighbourhood (197,000 sqm, 9 projects). It is also worth noting that there has been an increase in developer activity in Eastern Poland in the area of Lublin, Rzeszów and Kielce (in total 167,000 sqm, 4 projects)

The scope of development of infrastructure has had a decisive influence over the location of warehouses. The biggest concentration of large-sized storage facilities may be found at the intersections of A1 and A2, as well as the A1 and A4 motorways. Also, the areas with express roads are gaining in importance. As a result of the still-present regional diversification, prospective hirers operating in the storage space market in Poland have a wide range of options available to them (Raport - Rynek magazynowy w Polsce. Maj 2019).

An important advantage favouring the location of a storage facility is Poland's geographical situation. Our country is located in Central Europe, at the intersection of North-South and East-West trade trails. For the logistics industry, it constitutes an enormous advantage, especially for enterprises which have their distribution centres in Eastern and Central Europe. It is also significant that the Polish market is characterised by the high standard of their storage facilities coupled with their state-of-the-art equipment.

The key investors in the storage space in Poland are foreign investors. In the last three years, 70% of the capital invested in Poland has come from investors based in USA, the Republic of South Africa, Germany and Great Britain. The activity of the Polish capital remains marginal not only as compared to Western European economies but also to the neighbouring countries of Central and Eastern European.

Against the background of the Central and Eastern European countries, in terms of storage space, Poland offers one of the lowest rents in the region. Current base rents for the big-box space are still lower than in Czech (EUR 4.25 /sqm/month), Slovakia (EUR 3.90 /sqm/month), Hungary (EUR 4.50 /sqm/month) or Romania (EUR 4.0 /sqm/month). The difference in effective rents is also clear, and here Poland's competitive advantage becomes even stronger. It is also important that the cost of acquiring land is relatively low and the administrative procedures for obtaining permits necessary for this type of investments are faster (Raport - Rynek magazynowy w 2018 r. w Polsce).

The dynamic development of e-commerce remains the factor stimulating the growth of demand for modern storage space. It is estimated that in 2019 Poles will spend PLN 50 bn on internet shopping (Raport Interaktywnie.com: e-commerce 2019). This translates into an increase in the volume of logistic space needed for the servicing of both the domestic e-commerce market and foreign orders. The e-commerce industry has specific needs relating to space and the entire storage infrastructure. New challenges result from the necessity to quickly take orders and make goods available for sale, to efficiently complete goods; and from the fact that there are large fluctuations in the volume depending on the season, as well as holiday and sales periods. So as to meet these requirements, it is necessary to equip storage facilities with efficiently operating IT systems, also useful in warehouses servicing industries other than e-commerce.

The ERP system as the most common IT solution streamlining communication with the warehouse

It turns out that the most frequently used IT solutions including warehouse management are ERP (Enterprise Resource Planning) systems. They are applied in their basic version or in a version extended with a warehouse module. In 2014, when the Panel of Polish Logistics Managers together with Logisys published a report, 47% of those surveyed claimed to use an ERP system for the managing of their inventory levels (Raport Systemy informatyczne w polskich magazynach, 2014).

The ERP system is a collection of collaborating modules. They include such areas of operations as production planning, sales, accounting and controlling, human resources management and storage. Within the warehouse module, it is possible, among other things, to register entries and withdrawals, to prepare orders based on the analysis of production plans, to gather information on orders from customers and suppliers.

The main objective of ERP systems is the integration of all departments and functions within an enterprise. It supports the management of the entity in the scope of planning, production and distribution which directly affects the day-to-day operations of warehouses. The integration means using a shared database within one system. Owing to such an approach, the company uses only one set of data.

Data in the ERP systems are available in real-time immediately after they have been entered. This also means that all incorrect entries are instantly visible. As a result, users need to exercise caution while entering the data. It is of key importance that the system contains only correct data (Jakimowicz, Saniuk, Saniuk, 2015).

IT solutions applied within the ERP systems may perform the following functions:

- initiating functions - the processing of orders and preparation of documents,
- planning functions – the forecasting of dependent and independent demand,
- control functions – the comparing of results with the assumed customer service standards,

- coordinating functions – planning of sales, preparation of production schedules, planning of material requirements,
- integrating functions – combining the systems of an enterprise with external systems of customers, service providers (Majewski, 2006).

These integrated ERP information systems are by nature planning systems. Their comprehensive functionality refers to both the operating and strategic management levels. However, there are situations when it is necessary to reach for more advanced IT solutions.

WMS as a specialized tool for stock management

The specificity of storage processes means that, especially when it comes to larger business entities, there is also the need to apply an appropriate additional system apart from the ERP system. Then, the WMS (Warehouse Management System) becomes such a system. This comprehensive IT solution gathers detailed information on the place of storage, characteristics of the goods stored (such as best before dates, storage conditions, etc.) and also a number of other data necessary for the proper functioning of a warehouse (Matulewski, Konecka, Fajfer, Wojciechowski, 2007).

The Warehouse Management System (WMS) makes it possible to manage warehouses both in terms of inventory levels, the location of individual goods and in terms of the management and supervision over processes carried out within the warehouse and at the interface of production, entries, forwarding and other processes. The functional scope of the WMS is very broad. Its functionality includes:

- hierarchical division of the warehouse structure,
- spatial division of storage spaces,
- defining of logistic parameters for items,
- control of quality and quantity of goods delivered,
- automated identification,
- returns management,
- inventorying,
- management of returnable packaging,
- management of lots and best before dates,
- tracking of storage lots and drivers,
- work in a wireless data exchange mode (Kanicki, 2011).

The application of the WMS speeds up order processing, reduces losses related to past "best before" date product, streamlines the flow of materials, minimizes inventories levels and increases the precision of deliveries. The main advantages of a warehouse IT system include compatibility with external systems, increasing of the quality of deliveries and customer service levels, the tracking of storage drivers and dates, ordering of processes and resources, the reduction of logistic costs, the streamlining of distribution processes, and control over the logistic chain. Flexibility also allows it to be used in any type of a warehouse, increasing work efficiency. An additional benefit is also the option allowing for preparation and analysis of reports for individual customers, carrying out of complex settlements of logistic services, compatibility with warehouse automation devices and mobile devices, and data exchange with external systems.

The WMS is a kind of visualization of warehouse operations. It provides real-time information on the state of key hardware components, at the same time notifying the staff if any irregularities occur. The system gathers information referring to types, quantities and division of storage spaces, data concerning items, their best before dates, batches, indicating the manner of storage. It is a specialized tool supporting all operations carried out in a warehouse and relating to the physical process of placing goods in a warehouse. It allows the business to manage any number of warehouses, enabling a division into storage areas and spaces.

The key players in the present global WMS market are SAP, Oracle, Manhattan Associates, HighJump, Synergy, Tecsys, Reply, Epicor Software Corporation, PSI Logistics, IBM and PTC. Warehouse systems are most frequently used in the distribution industry (i.e. where the massive movement of goods occurs). Another market segment intensely investing in the WMS are large production companies supplying their goods from their warehouses.

While implementing the system, you need to consider high costs and a long deployment time. The number of individual modifications is also limited.

Directions of change in the scope of computerization and automation of warehouse processes in the future

The constantly changing needs of customers and enterprises create new challenges that IT systems handling warehouse operations need to face. The

e-commerce industry is becoming an arena of exceptional challenges. Customers in this sector expect faster and faster deliveries and larger and larger numbers of products. A modern facility that lessees selling on-line will use should also be automated. Only then, is it possible to cope with numerous industry-specific challenges regarding among other things human resources, fluctuations of sales volumes and time pressure (Berlowski, 2019).

So as to shorten the completion time and to avoid errors, more and more often businesses implement pick-by-voice, pick-by-light, pick-by-vision solutions, or combined options, which allow an employee to faster pick a product from a shelving unit and to confirm the operation with a voice command. The pick-by-vision systems consist in the completion of orders by a person moving around on a warehouse trolley or pulling a completion trolley and equipped with special goggles with an extension visualizing the next step in the process. Then, the next warehouse locations and the number of items to be collected will appear on the display. The process becomes intuitive, and the number of errors is reduced because the goggles display shows the exact location and the assigned volume (Raport Magazyn idealny dla e-commerce).

Although bar codes remain the most standard solutions used for tracking goods in warehouses, RFID (Radio Frequency Identification) is constantly gaining in importance. RFID technology is one of the methods used in a warehouse. Solutions based on RFID chips used for the identification of goods in correlation with readers receiving signals from RFID chips limit the risk of error occurrence. Gates or conveyor belts in warehouses are equipped with such readers so that every item that passes through them is correctly identified. Such solutions combined with the warehouse system allow for the automation of storage transactions recorded in the software. They allow an organization to carry out many system transactions without human interference, e.g. the automated issuance of documents, movements in stocks, purchase entries.

The need for meeting customers' expectations resulting from the growth in e-commerce industry speeds up the development of the market for WMS software. According to the Grand View Research report, the global market for these systems will show an average annual growth of 16.3% until 2025 measured using CAGR (Compound Annual Growth Rate). The value of the market for these systems as at the end of the projection period will amount to USD 5.25 bn (Report Grand View Research), of which more than half of the revenue (55%) will be generated by cloud-based WMSs.

Compared to traditional local systems, cloud-based WMSs offer more functions, and most importantly, the initial implementation costs are low (what is crucial especially for smaller enterprises). A cloud-based WMS is a good solution for businesses characterized by simple warehouse processes, unautomated manual operations, and a lower numbers of operations. Larger organizations with complex automation should rather consider hybrid solutions combining a stationary component with a component placed in the cloud (Meissner, 2019).

The arguments for the implementation of cloud-based solutions include a fast implementation process and lower maintenance costs. A client does not need to have his own IT infrastructure or a team responsible for its maintenance. Also, cloud-based solutions enable a quick increase in hardware efficiency for the system when there is a peak sale period. Before making a final decision on the version of the WMS, we should consider issues relating to data security and their real-time availability.

Additionally, robotics enters warehouses on a larger and larger scale. Producers collaborate with the suppliers of systems for warehouse management, developing customized software and intelligent robots, which help manage the movement, storage and sorting of warehouse resources. The Internet-of-Things (IoT) is another new trend in warehouse operations. Detectors and data transfer technology may be built-in warehouse components such as conveyors and forklifts which allow organizations to track, coordinate and control both physical facilities in the warehouse and the entire supply chain.

Owing to the development of technology and the concept of IoT, the process automation enables handling larger numbers of warehouse transactions without increasing the number of employees. Autonomous shelving units may, on their own, put aside and release specific goods based on received orders. The number of autonomous robots is also on the increase. In 2016 Amazon had 4,500 robots, in 2017 the number increased to 45,000, whereas in May 2019 it was more than 100,000. As the management of the company claims, full automation of storage and completion processes will be possible not earlier than in 10-12 years.

Conclusions

Up to now, an investment in storage space was affected by such factors as location, road infrastructure, the availability of international links, and personnel issues. Taking into account the present conditions, the availability of labour has becomes a key factor. Low unemployment levels and the aging of society have forced investments, especially those from the e-commerce and light production sectors, to move in search of locations offering available staff. An important direction for the development of storage space in the coming years is the further computerization and automation of warehouse processes. Also, the application of IT systems in buildings supports both owners and lessees, combining the work of machines and humans using applications, detectors and wireless communication networks.

While choosing IT systems for the management of warehouse processes, a dilemma arises. Businesses are wondering whether to purchase a separate WMS or an advanced warehouse module for the ERP system. The experience demonstrates that both solutions are in use and here the market is equally divided.

In Poland businesses owning storage space of not more than 5,000 sqm tend to use the ERP module. Companies with larger needs manage their warehouses with the use of WMSs as they are believed to be more flexible and better suited for warehouses than the ERP systems. Owing to automation, robotics, artificial intelligence and other advanced technologies, a modern WMS is a software considered capable of handling the majority of distribution operations. It makes inventories visible and it integrates with transport management systems; and with other solutions to streamline the movement of goods from a producer to a warehouse, and then to the retailer and finally to the end-customer.

■ Chapter 8 ■

YouTube as a Tool for Promotion in Tourism

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Abstract: The paper shows video content in YouTube as a new tool for promotion in tourism. It defines the main terms as marketing, promotion, user generated content, YouTuber, influencer etc. The aims of the research were to present, characterize and compare the popularity of selected YouTube channels with tourist content from Poland and other countries. Also an exemplary action using YouTube, conducted by the Polish Tourism Organization, was described and its effects were assessed. The analysis of empirical studies confirmed that respondents know tourist channels (mainly Polish), but their popularity is much lower than the popularity of top YouTubers. YouTube rather rarely is used to search for tourist content and general entertainment, lifestyle, fashion or gaming are more popular topics. Respondents use the site to search for tourist content, but less than a half of respondents follow YouTubers' recommendations. A small role is also played by YouTube in the process of the selection of destinations by users who rarely rely on materials available on the site when choosing the place of their future travels. That said, the continuous increase in website and the analysis of research results confirmed that YouTube may be an important tool for tourism promotion and the popularization of travelling.
Keywords: YouTube, video content, influencer, tourism, promotion, user generated content

Introduction

Inrecent times, the Internet has become an inherent tool accompanying humanity. It enables communication, serves as a tool for data exchange, allows easy access to a number of services, such as as banking and shopping. It is a source of information (although not always trustworthy) as well as entertainment. Along with the development of the Internet, new and different types of websites were formed. One of them is user-generated content

(UGC), which applies to different types of content, e.g. blog entries, podcasts, wiki entries and videos with the flagship of YouTube, which has in the last years transformed from user-generated content into a professionally generated content (PGC) video site (Kim, 2012). Although UGC video popularity can be temporary and is rather unpredictable (Cha et al., 2007), more and more often video-creators are using the Internet as a source of income by advertising brands, companies or places.

Having noticed the increasing number of travel-related content on YouTube, the authors of this article have decided to examine the use and role of this website in the promotion of tourism, which is the main aim of the paper. The specific objectives were: to present short characteristics of the analyzed website, present selected YouTube channels involved in the promotion of tourism and travel from Poland and abroad, and to assess and compare their popularity. Also, the exemplary action of using YouTube as conducted by the Polish Tourism Organization was described and its effects were assessed. Another important objective was to get to know and evaluate the knowledge of selected channels; and to assess the role of YouTube in the selection of tourist destinations by its users.

Methodology and theoretical background

In order to analyze the role of YouTube as a new tool for promotion in tourism, many sources of information were used. The analysis included Polish and foreign literature on new trends in marketing and many online sources due to the relatively new and dynamically changing nature of the analyzed phenomenon and the limited resources of traditional literature. The authors used also their own knowledge, observations and insights. Desk research was carried out to investigate the current popularity of Polish and foreign YouTube channels. To identify the knowledge of certain YouTube channels and the role of the website in tourism promotion, questionnaire surveys using the online survey technique were used. The research tool was a questionnaire which contained 14 closed-ended questions and one open-ended question. The results of the survey answered by 122 people were elaborated and presented using charts and tables.

Promotion and its tools

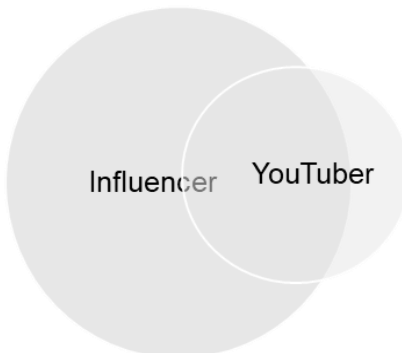
In order to define the term promotion, we should first define marketing and refer to the term marketing mix. Marketing can be defined as a problem of bringing scarce goods to the market (Kotler, 1972). It is also defined as an activity, a set of institutions, and a processes for creating, communicating, delivering, and exchanging offerings that have a value for customers, clients, partners, and society (AMA, 2013). The instruments influencing the market, i.e. the marketing mix consist - depending on the concept - of four or seven elements - 4P, 7P (van Waterschoot, van den Bulte, 1992; Szromnik 2008). The basic set of activities includes product, price formation, place and marketing communication, or promotion. In territorial marketing, however, the use of the above concept has some limitations, hence new or modified marketing mix concepts can be found in the latest literature. The effective acquisition of, for example, investments forced the extension of the above four elements by another three, i.e. by appropriately trained personnel (people), service procedures (process) and physical evidence (Szromnik, 2016). In another approach, 4P has been modified to include the client's viewpoint to the 4C concept, which refers to customer value, convenience and the cost of acquisition and communication.

One of the tools used to influence target groups is promotion (Florek, Augustyn, 2011), which is one of the inherent elements of marketing activities and the main component of marketing communication consisting in the transfer of information from the enterprise to the environment (Kaczmarczyk, 2015). Promotional activities include, among others: advertising, sales promotion, personal sales and public relations, Internet tools can be used as a medium of communication. This article investigates YouTube as an increasingly important online promotion tool using the AIDA model - it is an abbreviation of English words: attention, interest, desire to have a given advertised product, action (meaning persuade the buyer to take action). Marketing in YouTube has many opportunities to provide explanations about the products or services using interactive methods, so it is very useful in creating customer desire to purchase products or services (Hassan, 2015).

Social media and its users

Along with the development of the Internet and social media, new concepts have been created describing these media and people posting their content. The terms YouTuber and influencer are close to each other as some YouTubers become influencers. Both concepts are explained below.

Figure 1. Relations between influencers and YouTubers



Source: authors' elaboration

YouTuber is a person who uploads, produces, or appears in videos on the video-sharing website YouTube (Oxford dictionaries, 2019), regardless of purpose. The term influencer is defined as a person who makes content available on the Internet; and at the same time reaching a specific group of recipients and influencing it. Initially, the term influencer was used only for creators providing video (vloger) but later the definition also included bloggers, who now use different social media (Instagram, Twitter, Facebook, etc). Influencers are now more powerful than ever before, as they gain authority through their authenticity - very often these people share their opinions about the products or services at home or directly at the place of like hotel or tourist attraction. Consumers trust recommendations of friends and family and influencers for their audience are often treated like friends due to long-time relationships. They gain trust through their naturalness, which makes people follow them.

Results and discussion

YouTube as a promotion tool

YouTube was founded by Chad Hurley, Steve Chen and Jawed Karim in 2005. Initially, it was intended to serve as a place to share movies with friends of the above-mentioned founders. The first movie entitled "Me at the zoo" was published on the website on April 23, 2005 by Jawed Karim (user "jawed"). YouTube very quickly began to be successful and in 2006 it was taken over by Google for 1.65 billion dollars. The following years saw growing popularity of the website which is nowadays viewed by approximately 1.9 billion users monthly (Weiss, 2019).

Every day, people watch billions of hours of content - this time consists of billions of views and more than half of all views on YouTube come from mobile devices. YouTube as one of the main social media has become a tool for promoting people and ideas. It is a very influential medium that is popular among users all over the world. Creating an account on the website is free and the user has the option of: publishing movies, subscribing to creators, gather subscriptions (viewers), evaluate films, writing comments and react to other comments - response and commentary rating. YouTubers have the possibility to use the website for product placement, cooperation with brands; they can also get profits from Google ads displayed in the videos.

Tourism promotion in YouTube

The importance of YouTube is noticed by institutions responsible for promotion of countries. Polish Tourist Organization with the Ministry of Sport and Tourism started in 2018 a joint action #VisitPoland under which seven influential video bloggers from several tourist markets were invited to Poland. Among the invited YouTubers to Poland were: Louis Cole from Great Britain (FunForLouis), Alan Estrada from Mexico (Alanxelmundo), Christian Le Blanc from Canada (Lost LeBlanc), Conner Sullivan, Marko andAlex Ayling from the United States (Vagabrothers), Pau Clavero from Spain (Clavero), Angela An from Japan (InternationallyMe) (Poland.travel, 2019).

The main reason for using YouTube as a promotional tool was the cost per range and variety of viewers around the world who can be reached. What's more, the promotional action never ends, because these videos will live on YouTube all the time, as opposed to ads that have a limited time of issue (National Geographic, 2018). Interestingly, some experts claimed that another

value of this promotion tool is honest, true and convincing message (MSiT, 2019), but results of some studies deny it as less than a half of people trust video bloggers.

18 videos with varying popularity were published by the invited video bloggers until May 2019. Among about 5 million views the most popular was the film Visitando Auschwitz (visiting Auschwitz Nazi concentration camp) which was seen more than 1 million times. The popularity of all videos was compared and assessed in table 1. Another important impact of this action are the numerous comments below the videos written by the viewers who were mainly positively impressed by the uploaded materials.

Table 1. The effects of #VisitPoland action by the end of May 2019

YouTuber's name	Number of videos	Number of views (in thousands)
Alanxelmundo	10	1100 (Visitando Auschwitz) + 1820 other 9 videos
Conner Sullivan	2	660
FunForLouis	2	590
Clavero	2	427
Lost LeBlanc	1	197
InternationallyMe	1	181
Vagabrothers		No videos found (as of 28 May 2019)
Total	18	5000

Source: authors' calculation based on https://www.poland.travel/en/visitpoland (25 May 2019)

Another use of YouTube is the promotion of tourist products for children and youth. In and around the year 2015, some travel agencies started offering new products: camps teaching aspiring YouTubers how to create channels, video content or promote videos and holidays with YouTubers. Some camps hosted by young YouTubers were also offered in the United States and some European countries (Springwise, 2016). In this way YouTube players can also earn money during their free time spent among their fans, and travel agencies have the opportunity to highlight their offer and attract customers by offering camps where participants can meet with the creators of video content. YouTubers thus became a new tool for promotion of youth

camps. Some examples (printscreens) from Polish travel agencies in spring 2019 were presented below.

Figure 2. YouTubers advertising summer youth camps, 2019

"Meet them live!"

"Spend holidays with YouTubers"

Source: https://viacamp.pl/blog/obozy-z-youtuberami-sprawdz-kto-odwiedzi-naszych-uczestnikow-w-tym-roku1803201805000; http://stars4fans.pl/index.html

Popularizing travel and the promotion of places or tourist products is the main way of using YouTube in tourist marketing. We can also observe development of tourist content on vlogs, and placing tourist content in relations from everyday life. The popularity of tourism-related content in YouTube is not as high as content related to gaming, lifestyle, fashion or entertainment. The channels with the highest number of subscriptions in the World (except YouTube's Sports, Gaming, Music channels) – T-Series has over 100 million and second - PewDiePie 96 million. To compare, the most popular channels with tourism content have 5-11 million subscribers (9 times less) and around 1-2 billion views, which was presented in Tab. 2.

Table 2. Selected YouTube channels with tourism content in the World

No	Name	Views (thous)	Subscribers (thous.)
1	CaseyNeistat	2 586 388	11 277
2	devinsupertramp	1 238 230	5 439
3	Mark Wiens	799 277	4 324
4	FunForLouis	309 162	2 020
5	alanxelmundo	279 393	2 038
6	Jack Harries	171 115	3 958
7	Mr Ben Brown	133 777	711
8	Sailing La Vagabonde	113 254	662
9	Lost LeBlanc	99 955	1 102
10	DamonAndJo	89 886	1 187
11	High On Life	63 970	618
12	vagabrothers	58 862	884
13	Clavero	36 607	626
14	internationally ME	20 181	233
15	RayaWasHere	11 863	191

Source: authors' study, as of 22.05.2019

Selected YouTube channels with tourism content in Poland, not only the most popular are shown in Tab. 3 below.

The two leading tourism influencers have more than 800 thousand subscribers each, but the content on their channels in not only related to travel – they present also video on entertainment or beauty. As a comparison of the popularity of tourism content to other YouTube videos, the most popular Polish YouTubers are Blowek with 4,1 million subscribers and Stuu (3,9 million). As it can be clearly seen, tourist content in Poland is also much less popular than general entertainment, gaming, lifestyle, etc. - the ratio of subscribers totals1:4,6, so the relative popularity of tourist content in Poland is higher than among the world-known YouTubers. On the other hand, some of the top YouTubers are expanding their content to tourist issues– examples can be: Friz, Versow or reZigiusz.

Table 3. Selected YouTube channels with tourism content in Poland

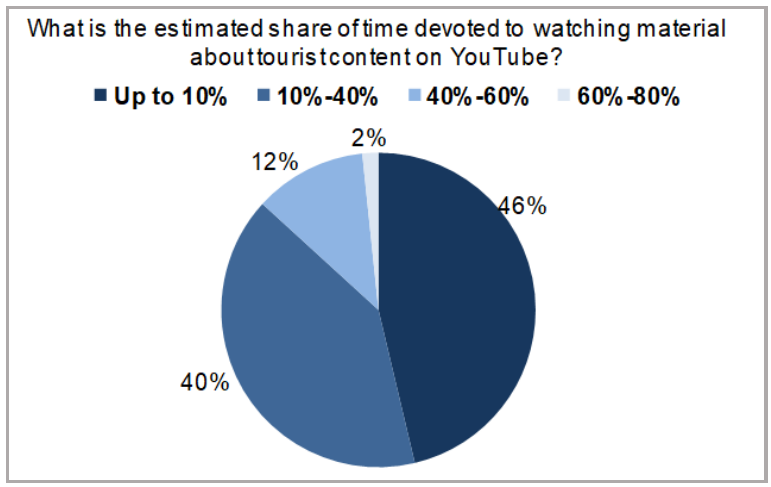
No	Name	Views (thous)	Subscribers (thous.)	Dynamics of subscribers (May 2018=100)
1	Krzysztof Gonciarz	202 570	868	117
2	littlemooonster96	106 656	841	105
3	Przez Świat Na Fazie	47 628	328	110
4	Autostopem Na Koniec Świata	35 423	171	
5	Tube Raiders	19 660	371	98
6	Fifty na Pol	12 794	225	
7	Globstory	15 061	177	166
8	Podróże Busem Przez Świat	9 994	95,6	
9	Jessa	7 260	72,5	110
10	Lovetotravel pl	2 353	3,8	
11	Polandtravel (channel of Polish Tourism Organisation)	1 383	2,5	
12	WPN - przyroda, turystyka, wydarzenia (Wigry National Park)	1 825	2,5	
13	TPNVideo (Tatry National Park)	1 226	3	
14	Szlak Orlich Gniazd	330	0,64	

Source: authors' study, as of 22.05.2019

Results of the survey

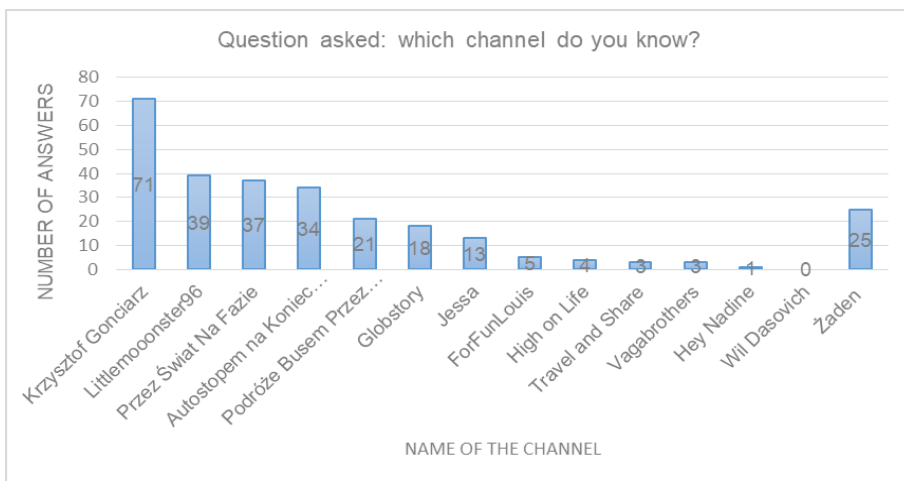
Among 122 surveyed people 60% were women and 40% men. Most of them were aged 19-26 (75%) or 27-40 (21%), no one older than 60 took part in the survey. Out of 122 respondents, only one denied the knowledge of YouTube website, 81% confirmed having an account. 93 respondents (76.86%) answered that they visit the site daily and 16 (13.22%) said they visit the portal 2-3 times a week. 80% of respondents watch videos related to travel on YouTube, but as Fig 3 shows, the share of time devoted to watching tourist content is usually rather small – by 46% of respondents it is below 10% and by the next 40% between 10 and 40%.

Figure 3. Time devoted to tourist content watched on YouTube



Source: own study

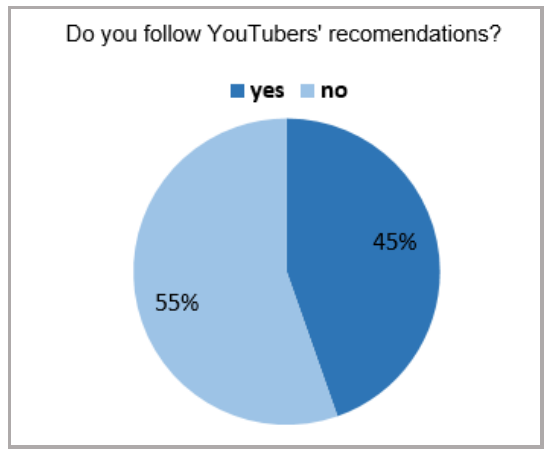
Figure 4. Knowledge of selected YouTube channels



Source: own study

Respondents declared that they know tourist YouTubers (mainly Polish), and their popularity is proportional to the general popularity of their channels. Interestingly, despite the knowledge of channels, their popularity does not translate into their impact on the audience – less than a half (45%) of respondents follow YouTubers' recommendations.

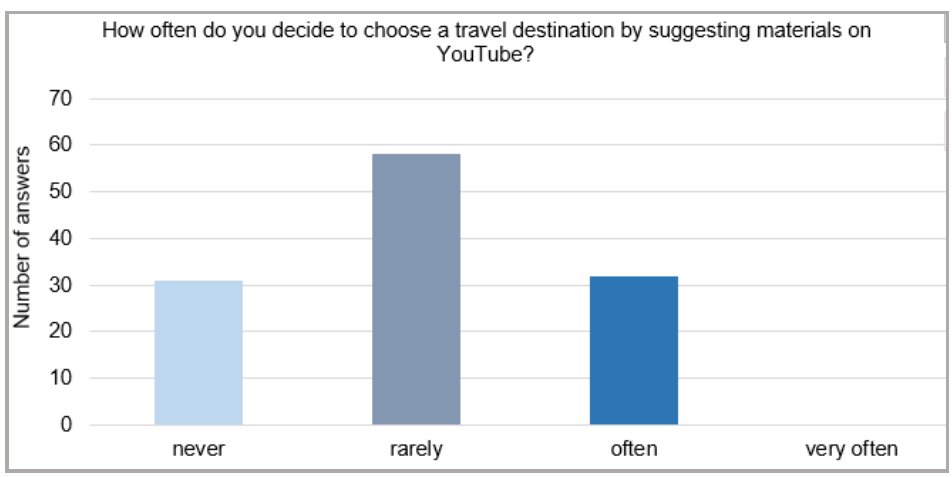
Figure 5. The impact of YouTube on the viewers



Source: own study

Also the role of YouTube in the selection of destinations turned out to be not really important. A significant proportion of respondents said that the never (26%) or very rarely (48%) refer to the materials available on the website when choosing a place of the future travels (see Fig. 6). On the other hand, 26% of those surveyed declare that they are often influenced by YouTubers when choosing travel destinations.

Figure 6. The impact of YouTube by choosing travel destination



Source: own study

Comparing these results to other studies it is clear that the results are mostly similar. Wave X'' survey conducted by UM Agency in 2018 (UM, 2018) showed that less than half (42%) of the respondents trust bloggers' and vlogers' reviews on products and services. Furthermore, only 47% of consumers are influenced by opinions of internet creators. In this study, 45% of respondents followed YouTubers' recommendations. On the other hand, study on a group of 8 by Lepisto and Vahajylkka (2017) showed a much higher influence of YouTubers on buying behavior of their audience, the higher the higher was the trust in YouTuber.

Conclusions

YouTube, as one of the most popular websites and mobile apps is gaining more and more importance as a tool for promotion. It is often used by influencers to advertise products and promote tourist destinations. Tourist influencers are not as popular as channels with gaming, lifestyle, comedy etc.; generally, YouTubers with a wider scope of videos have more subscribers. In any case, channels with tourist content have many viewers, and the number of subscribers of the top-known channels equals 1-5 million in the World and 100-400 thousand in Poland.

The analysis of empirical studies confirmed that respondents know tourist channels (mainly Polish), but their popularity is much lower than the popularity of top YouTubers. YouTube is rarely used to search for tourist content only; and general entertainment, lifestyle, fashion or gaming are the most popular topics. The continuous increase in the website's popularity and an analysis of research results confirmed that YouTube is an important tool for internet marketing and may play an important future role in tourism promotion and the popularization of travelling. Respondents use the site to search for tourist content, but more than a half of respondents do not follow YouTubers' recommendations. Of lesser importance is the role of YouTube in the selection of destinations by users – a significant proportion of respondents said that never or very rarely suggest by materials available on the site when choosing the place of the future travels.

As generally the popularity of video content is growing and most attractive services are said to be: Netflix (28%), YouTube (27%) and Spotify (27%) (UM, 2018), the future of YouTube as a tool for promotion, not only of tourist products, seems to be one of infinite possibility.

PART 2

THE MANAGEMENT OF INFORMATION IN THE AGE OF DIGITAL TRANSFORMATION

PUBLIC SECTOR

■ Chapter 1 ■

Challenges and Risks for the Securitizing of Information Data in Poland and the EU

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Abstract: The progress of civilization with the development of technology is becoming more and more important in the context of the information threat. Threats to the security of information data are today crucial for the security of the state and society. Today, a serious challenge involves counteracting the threats to the security of information data in order to avoid the destabilization of information systems and ICT systems.
Keywords: security, information security, threat, information

Introduction

The 21st century is a rapid progress in civilization that has taken place in the area of technology and information. The main activities take place in the field of mobile and ICT technology through the public Internet, which has affected all spheres of human life. The rapid development of social networks, various types of communication media, as well as the development of large-scale online and mobile banking and e-government, contributed to easy and quick access to information. Information has become one of the most important resources of state organizations and institutions today.

The 21st century, in the literature of the subject called the information age, has brought about a change in the nature and shape of threats in the world, because in the times of universal access to information technologies, new dangers have arisen (Koziej, 2011, p. 268), which are closely related to the use of information networks and information systems, e.g. crimes using a computer as a tool, loss of information related to computer hacks, malicious codes and viruses, espionage, sabotage, vandalism (Liderman, 2012, p. 24).

The growing role of information in the modern world increases the threat to its security (Nowak, Scheffs, 2010, p. 22).

The purpose of the paper is to present the challenges and threats to the security of information data in Poland and the EU in the era of open access to the Internet.

Information security

Information security is, in the most general sense of this wording, the storage of information in databases which should be protected. This applies in particular to data of a strategic nature, of key importance for the functioning of the enterprise, or another entity, or an ordinary person. The project referring to the information system supporting strategic management, should take into account the issues related to information security, by defining a whole set of rules as well as the methods and tools for protection, as well as the supervision over information. The definition of information security is very problematic, because the technological development in the field of computerization is changing intensively, there are more and more new activities that break the protection. Thus, the precisely formulated definition is closely related to the term referring to the security attribute to which it belongs in the literature:

a) confidentiality – information for unauthorized persons, entities or processes is not available,
b) authenticity – the identity of a particular entity or team is as it was previously declared,
c) accessibility – the opportunity to use on the part of a person who has the right to do so, at a particular time,
d) data integrity – an indicated quality means that certain data has not been changed or destroyed in an unauthorized manner,
e) system integrity – a quality that allows the system to perform the previously intended function in an unaffected manner by unauthorized manipulations (intentional or accidental),
f) integrity – data integrity as well as the system,
g) accountability – the activities of a particular entity, for example a user, may be assigned to them,
h) reliability – consistent as well as intended behaviour and effects (Czekaj, 2012, p. 128).

Information security can be understood as a resultant of legal security as well as physical, information and communication (ICT), and personal-organizational security (Polaczek, 2006, p. 137).

Security measures are taken during situations that pose a threat to the system or resources due to the fact that they are difficult and very costly tasks, as a result of which they are often interrupted or not applied at all. More and more threats are encountered in the modern world, which at the same time increases the risk of violating the protection of data collection and use as well as information loss. Therefore, it is necessary to create a strategy model for information management and its security in the organization, which includes such elements as: systems, processes, people as well as processed information (Czekaj, 2012, p. 129).

Threats to information security

In the modern world, information is an extremely important "commodity", which is why it is often an element of criminal activity aimed at obtaining it in an illegal and unauthorized manner. The first threat in this regard is cybercrime.

The concept of cyberspace is often used as a synonym for the Internet or for all activities related to the use of a computer, computer system, computer networks or any electronic communication system (Siwicki, 2013, p. 15). It is also indicated that the most accurate is to understand cyberspace as a "digital space for processing and information exchange processed by ICT systems and networks, along with links between them and relations with users" (Szpor 2011, p. 357).

According to the definition developed during the 10th United Nations Congress on the Prevention of Crime and Treatment of Offenders, a division was proposed for:

1) cybercrime in a narrow sense (computer crime) involving attacks against the security of computer systems and electronically processed data, committed with the use of electronic operations;
2) cybercrime in a broad sense (computer crime) covers acts committed with or against a computer system or a computer network, such as illegal possession and the sharing or dissemination of information via a computer or a network (Siwicki, 2013, p. 16).

The term cybercrime is used by the Commission of the European Communities, which in the Communication from the Commission to the European Parliament, the Council and the Committee of the Regions from 2007 on "Towards a general strategy to combat cybercrime" under this term means "criminal acts committed using electronic communications networks and information systems or directed against such networks and systems". Cybercrime consists of three types of attacks. The first includes "traditional" forms of crime, such as fraud or falsification committed using electronic information networks and information systems. The second type is the publication of illegal content in electronic media (e.g. materials related to the sexual abuse of children or incitement to racial hatred). The third type includes crimes typical of electronic communication networks, e.g. attacks against information systems, DoS attacks and IT sabotage. The Communication also indicates that all these types of crimes are connected with the fact that they can be committed on a mass scale, and a geographical distance between the place of committing a crime and its consequences can be significant (Siwicki, 2013, pp. 16-17).

In general, a group of acts, known as cybercrime, includes the use of telecommunications networks (e.g. a public switched telephone network (PSTN), a computer network, the Internet, a telex network, a digital service integration network – ISDN) to violate any legal good protected by criminal law. The most important features of cybercrime can be considered as acting in a specific environment genetically related to computer technology and using it to commit common crimes (e.g. fraud, document falsification) as well as less conventional ones (e.g. cracking, hacking, phishing). The cybercrime includes:

1) offenses against the security of information being processed,
2) crimes related to the use of mass media to disseminate or present information prohibited by law (so-called offenses related to the content of information),
3) other crimes involving the instrumental exploitation (use) of electronic information networks and information systems to infringe legal goods protected by criminal law (Siwicki, 2012, p. 246).

Information security very broadly refers primarily to issues related to electronic banking. The issue of security in the area of internet banking is considered in the recommendation of the Polish Financial Supervision Authority of November 2015 relating to the security of payment transactions executed via the Internet by banks, domestic payment institutions, domestic

electronic money institutions and cooperative savings and credit unions. This document indicates a number of recommendations, including organizational and technological solutions aimed at increasing the security of access to online banking services. The Polish Financial Supervision Authority indicates recommendations in the area of data authentication, duration of single sign-on sessions, application of a strong authentication procedure involving the use of three independent elements, of which at least two are associated with the client. Undoubtedly, the content of the recommendation is closer to banking practice than fairly general regulations of the statutory rank (Rutkowska-Tomaszewska, 2017, p. 141).

Threats that are associated with the use of e-banking were primarily presented by the Polish Financial Supervision Authority. The Commission first of all listed them as:

a) phishing of data that allows transactions to be carried out;
b) theft with the use of malicious software for this purpose;
c) copying the payment card;
d) theft using a card with the possibility of contactless payments;
e) theft using data from the payment card customer;
f) dangers that are associated with the use of mobile applications;
g) customer identity theft;
h) "Nigerian fraud";
i) theft in the online store (Polish Financial Supervision Authority, 2014, p. 11).

The Polish Financial Supervision Authority also lists crimes related to e-banking, which have their regulations in Polish law. These crimes include:

a) Hacking, that is obtaining unauthorized access to all data by breaking security systems.
b) Spoofing, which should be understood as taking control of computers that belong to other users of electronic banking, which is intended to be used for activities that go beyond the relevant legal norms.
c) Sniffing – capturing information transmitted in local networks and WiFi networks, which is aimed at obtaining data of bank clients for their subsequent unlawful use.
d) Installing devices on ATMs that collect data from a payment card.
e) A computer virus, a program that has been placed in another program that replicates itself. As a result of this type of virus, for example, it is

possible to lose important data from the computer or to have difficult work in practice.

f) Puzzle bomb – a kind of virus. Its activation takes place on a specific day as well as at a specific time, and as a result of the user's execution of a particular operation.
g) Computer worm – the indicated type does not destroy data, but it may lead to loading of some programs on the computer.
h) Trojan horses, commonly known as so-called "Trojans". They can capture, for example, access passwords from the user of a particular computer. They start when a specific computer program begins.
i) Phishing – its essence consists in sending by e-mail messages from people who impersonate a particular bank, for example with a request to log in to the bank's website – these actions are aimed at phishing individual data about the client (such as password).
j) Pharming – is a form of phishing. It involves redirecting the user of e-banking from the correct bank website to the one that was created in order to scam individual data from the client (Polish Financial Supervision Authority, 2014, p. 11).

ICT security covers in this context all actions that should be taken to guarantee a defined level in ICT systems:

a) Confidentiality;
b) Integrity;
c) Accessibility;
d) Accountability;
e) Authenticity;
f) Reliability (Grzywak, 2003, p. 207).

One of the most important issues related to the functioning of ICT systems is the identification of users. It is most often implemented using a third, trusted website that meets the organizational and technological requirements as set out by law. In the case of electronic communication used most commonly in practice, the solution is an electronic key certified by designated institutions (Gołaczyński, 2016, p. 175).

Attacks that used malicious financial software in 2013 concerned 66,74% of malicious banking programs, 4,18% of *keyloggers,* 20,18% of software that stole *bitcoin* portfolios and software *downloaders* for *bitcoin* mining – 8,91% (www.securelist.pl, 29.04.2019).

Hacking attacks mainly concern financial frauds, which constitute up to 50% of attacks involving harmful software (Rutkowska-Tomaszewska, 2017, p. 129).

Mobile devices have not been a target for a long time from cybercriminals. Their first generations had limited functionality and it was difficult to create malware for them. The situation changed with the emergence of smartphones and tablets; devices having the direct opportunity to connect to the Internet as well as explicitly available tools for the development of applications. For several years, the number of malicious programs targeting mobile devices has increased, especially those with the installed Android operating system, which is vulnerable because it allows third parties to access *App Stores* and distribute rogue applications. Android is the main target of malicious attacks – in 2013 it represented 98,05% of attacks, which proves the popularity of the indicated operating system as well as the pressing issue of its software vulnerabilities (Rutkowska-Tomaszewska, 2017, p. 129).

In 2015, 2,333,777 new types of malware attacks were identified for devices with the installed Android system. Analysts from G Data SecurityLabs predict further increases in hacking attacks on smartphone and tablet users, as more and more people use mobile devices during *online* shopping or bank services. Experts from G Data underscore the fact that cybercriminals are targeting the Android system, and are generating significant profits.. Recently, criminals have been increasingly looking for gaps in systems that allow infecting cars connect to the Internet or electronic fitness bracelets. Most of them are controlled by Android applications (www.cyberdefence24.pl, 22.04.2019).

According to the prepared report "Kaspersky Security Bulletin 2015" in the ranking of the 10 most popular programs designed to steal money for the first time there were financial mobile threats, i.e. two groups of mobile banking Trojans (Faketoken and Marcher). Marcher programs steal data related to payments from Android devices. In turn, those from the Faketoken family cooperate with computer Trojans. The user is prompted to install the application on the phone, which is a Trojan that intercepts single-use codes confirming bank transactions (www.dobreprogramy.pl, 29.04.2019).

Research has revealed that 40% of applications do not check the authenticity of the SSL certificates used, which allows for the creation of a false certificate in order to perform a *Man in The Middle* attack. Over 20% of applications with the bank communicated without any encryption. As much as

90% of the application contained unencrypted links (without SSL), allowing a hacker (which from the application) to intercept the move, injecting the appropriate JavaScript/HTML code to create, for example, a false login screen to extract access data to the user's bank account. Over 50% of the applications are susceptible to embedded malicious JavaScript code due to the wrongly implemented user interface (UIWebView), in which entered and displayed information, among others allows for an XSS attack (for example allowing sending e-mail/MMS/SMS messages directly from the client device). Only 20% of the applications have launched PIE (*Position Independent Executable*) and *Stack Smashing Protection* options, reducing the manipulation risk that is associated with possible memory errors (www.niebezpiecznik.pl, 29.04.2019).

In the case of 70% of applications, there are solutions for confirming the identity of the bank's customer user, such as two-factor authentication, which, besides the password to access the account, also requires an SMS code sent by the bank. Moreover, static analysis has shown the possibility of extracting authentication data from the source code. The ease of acquiring such information enables hackers to gain access to the bank's development group and perform larger-scale operations, such as injecting malicious code into the application and infecting all clients logging in to the application using this application in this bank. Bank account information and customer transaction history can be extracted from the unencrypted *sqlite* database created by the application. The base can be captured remotely (by *exploit*) or locally, through an application that performs *jailbreak* of the iOS system (www.niebezpiecznik.pl, 29.04.2019).

The use of mobile banking involves the risk of losing confidential data as well as the possibility of unauthorized access to the bank's customer account. According to the 16th EY World Security Information Survey, the risk of using e-banking is growing. There are no safeguards on the market that cannot be broken. The mobile revolution is seen as the main threat to data security. According to EY, 83% of mobile applications allow hackers to break in and get data. Although the development of mobile banking is associated with an increase in risk, it is promoted as a banking solution arising from the the expectations of customers who want to make everything easier, simpler and faster. Unfortunately, such simplifications often occur at the expense of security. No security solutions can completely eliminate the risk (www.finanse.wp.pl, 29.04.2019).

Many millions of users can use the Internet at the same time. An important and still current problem in this respect is the issue of network security, especially in the context of the functioning and use of online banking, primarily in relation to providing the exclusive right of access to the account held to the client and managing the funds collected on it. The basic threats affecting the security of online banking have been relatively long identified, they include confidentiality and inviolability as regards the information provided, verification of the user's authenticity and access control (Juchno, Kaszubski, 2001, p. 12).

The key element for the online banking security is the possibility of the bank accepting the order that is made by the holder of a specific account - and not another person. An obvious difficulty in the indicated situation is the lack of simultaneous presence of the parties, at the same time affecting the inability to identify the direct identity issuing the disposition. The bank, as a service provider and also a public trust institution, has the responsibility to create solutions that enable effective the verification of a particular user's identity in order to ensure protection of the funds entrusted by clients (Rutkowska--Tomaszewska, 2017, p. 138).

In addition to the methods of committing crimes that are associated with the use of data, the literature has distinguished traditional physical methods of obtaining identification elements and methods related to the Internet. The first group included equipment theft, direct access to information, search of garbage, wallet theft, correspondence theft, reading over the shoulder, skimming, abuse by employees, telemarketing and fake telephones. The second group includes such behaviours as: hacking, phishing, pharming, redirectors, Nigerian fraud, keyloggers and password thieves (Lach, 2015, p. 159).

In this respect computer viruses are also very important. A computer virus is a self-replicating computer program placed in another program (the host). It has the ability to affect any element of the computer system. A computer worm is similar to a virus, but it makes its copies completely without a need for a host program. Computer worms also fill the computer's memory with a large amount of accidentally generated data, which causes the computer to slow down or cease functioning. A Trojan horse is software that pretends to be useful or interesting for the user, additionally has undesirable, hidden functionality. The effect of the Trojan horse may be, for example, the deletion of selected files, the formatting of the disk, the invoking of encryption

systems, and the sending of sensitive data to the author or owner of the Trojan horse. *Rootkit* is a hacker software that hides its presence in the system. It also allows hiding files, processes or network connections, so it can also hide the operation of other hacking programs. *Adware* is software that displays ads, in a negative sense it is software that tracks user activity on the Internet, and then creates its profile and displays contextual advertising. *Exploit* is a program or its fragment (usually a few lines of code) that exploits a vulnerability in the software installed on the victim's computer. *Dialer* is software that connects to the Internet through a different access number than the one chosen by the user. *Hoax* is a program that displays false information that a virus is on the computer (Plywaczewski, Filipkowski, Rau, 2015, pp. 531-532).

Ransomware is software that is spread mainly via email, but it is also possible to let it into the system through the actions of irresponsible users. Ransomware cuts off users from documents by encrypting files. By opening the attachment, the user initiates infection, software propagation, mutation and activation of system destructive functions. Malicious code downloads its updates, mutates and thus hinders its detection and retrieves the RSA key from the Internet. A step in encrypting files that are important to the user follows. Each of the files is encrypted with a separate key with a length of 256 bits, which hinders further process related to file recovery. The software is not limited to local file encryption; it searches network resources in order to extend the scale of the damage. The original files are removed from the user's local resources and from network resources. The documents are recovered only after paying the appropriate fee to the account of the software developer. The amounts vary from tens of dollars to several hundred thousand US dollars, depending on the wealth of the discredited organization (Kurpiewski, 2016, pp. 25-26).

Conclusion

Summarizing the above considerations, it should be pointed out that in the area of data security, the greatest threats are located in cyberspace. The studies on the multifaceted nature of cybersecurity lead to the conclusion that many countries around the world see the need to implement actions to ensuresecurity, and the problem is global. The analysis also shows that there are significant differences between individual countries in the area of legislation, organization and the technical means at their disposal to fight

cybercrime and attacks on systems and networks. Some countries have appointed special offices or agencies at government level which are responsible for technical or educational matters. Many countries have recognized the need for a strategy regarding cyber security as well as the establishment of incident response centres. A special role is also played by education pertaining to online threats; and many countries have assigned a special role to universities which conduct certified studies in the field of cyber security. Incidents that violate cybernetic security, either deliberate or accidental, the number of which is increasing at an alarming rate, may cause disruptions in the provision of basic services that are taken for granted, such as water supplies, health care services, electricity supply and mobile telephony services. The largest number of security incidents is related to the installation or use of unauthorized software in organizations, which represents a breach in that particular security system. The consequence of the bad security of IT systems and data processed in them may be criminal liability, the loss of reputation or financial loss.

■ Chapter 2 ■

Fiscal Cyber-tools in the Fight against Tax Evasion on the Example of the VAT Tax Gap

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Abstract: The following article deals with an important issue of the fight against the VAT gap resulting form criminal activity. There are no laws against tax optimization as defined in the present text. In addition, the differences between tax optimization and tax evasion have been outlined. The term of 'VAT gap' has been defined and its extent presented. Moreover, the application of the Laffer Curve theory in increasing the VAT has been referred to. Chapter Three characterizes selected techniques and methods of limiting the VAT gap, e.g. reverse charge, split payment, increased penalties, joint responsibility for tax arrears, the electronic mechanism of Standard Audit File for Tax, the creation of National Revenue Administration, the IT System of the Clearing House. This article aims to demonstrate that the actions taken with the view to limit the VAT gap have had tangible effect. While the budget revenue on VAT and taxes in general has been increasing, it is difficult to point out a single most efficient tool, as a number of various actions have been introduced simultaneously.
Keywords: grey economy, tax gap, tax crime, VAT

Introduction

Tax revenues constitute a great majority of the state budget, and the VAT tax is a crucial element of the revenues. Indirect taxes amount to 72% of state revenues, 47% of which is VAT tax (Strecula, 2018, p. 581). Tax payers often resort to a variety of actions, at times bordering on illegal, in order to reduce their tax obligations. Some of these actions are often defined as tax optimization. Any tax optimizing activity must be within the limits of the

functioning tax law. Crossing those limits is characterized as criminal activity. Tax optimizing activities are essentially only permissible as far as income and wealth taxes are applicable. Due to its legal arrangement, the VAT tax and the compensation scheme for input VAT have created scope for abuse of the system instead of legal tax optimization. At the early stages, these tax liability reduction activities usually amounted to withholding the tax base, by undeclared sales or conducting taxable activities without registering as a taxpayer. Thus, they did not result in tax liabilities.

One of the conditions for Polish access to the European Union was harmonisation – adjusting Polish regulations on certain taxes to EU requirements. One of the EU founding assumptions is the free movement of goods and services. Customs frontiers and control made selling goods to foreign parties particularly difficult and a number of procedural requirements were to be met. This often led to customs seizing goods at the border. Indeed, opening the borders and the lack of formalities have brought about much greater trading opportunities. However, the lack of tax and customs control as well as a 0% VAT tax rate on exported goods with the possibility of compensation for input VAT have enabled tax criminal activities. Not only do these activities lead to taxes not being paid, but also, through fake transactions allowing for VAT compensation and reimbursement, they create room for tax evasion amounting to billions of Polish zloty.

Tax optimization and tax fraud

The notion of tax optimization is not derived from any legal norms. It is used to define a way of tax planning which is essentially based on minimizing the amount of tax paid, as opposed to calculating a tax liability whose height would be optimal for both the taxpayer and the tax authorities (Sokolek, 2015, pp. 183–184). Tax optimization includes searching for and identifying the legal instruments and organisational frameworks that provide the lowest possible level of taxation for a company, consequently maximizing a company's net profit. In result, tax savings are created. Such activities are in line with the functioning legal regulations and should not be used to bypass tax laws (Werner, 2013, pp. 58–59). In other words, using 'legal ways to modify and lower the amount of tax owed [tax avoidance], as opposed to tax fraud and tax evasion. Thus, any entity, regardless of its size, will take a set of actions leading to tax optimization, which in its essence is minimizing the amount of tax to be

paid. These actions are normally associated with business planning and usually involve tax advisors' (Stolarski, 2016, pp. 151-159).

Planning to make use of the available tax allowances and deductions on income tax requires one to become familiar with the rules of taxation throughout the fiscal year. In Poland it is tax advisors, a highly specialized group of professionals, who normally deal with tax optimization. Tax planning as well as tax optimization in small companies typically take place at the outset of their economic activity. What follows is strictly the implementation of the plan. Large enterprises update, correct and adjust their activities to new techniques and changes in the general court rulings on and administrative interpretations of tax regulations. New fiscal schemes are also introduced, allowing for the lowering the company's tax obligations in a legal way. The body of professional literature on the issue also defines tax-related savings as 'activities leading to lowering one's fiscal obligations, neutral to the tax law, in principle consisting in refrainment from certain activities that could lead to tax obligations' (Gaudemet, Molinier, 2010, p. 585). In this way, the taxpayer makes conscious decisions to take specific actions, potentially imposing a fiscal obligation on them. For example, buying an imported car results in excise duty to be paid. The amount is based on engine capacity (Żabska, 2013, p. 262). Buying a car with a lower engine capacity does not entail a higher tax amount. Choosing a quarterly tax statement does not impose the duty to make tax payments on a monthly basis, the tax is paid quarterly. Later, VAT cash statements transfer the tax obligation to the period when the payment by the counterparty has been made. The essential prerequisite of economic activity is profit maximization, not tax liability maximization. There are no grounds to impose the requirements of decreasing their profits on companies, be it private or corporate, so that the state tax revenues increase (Radzikowski, 2010, p. 10).

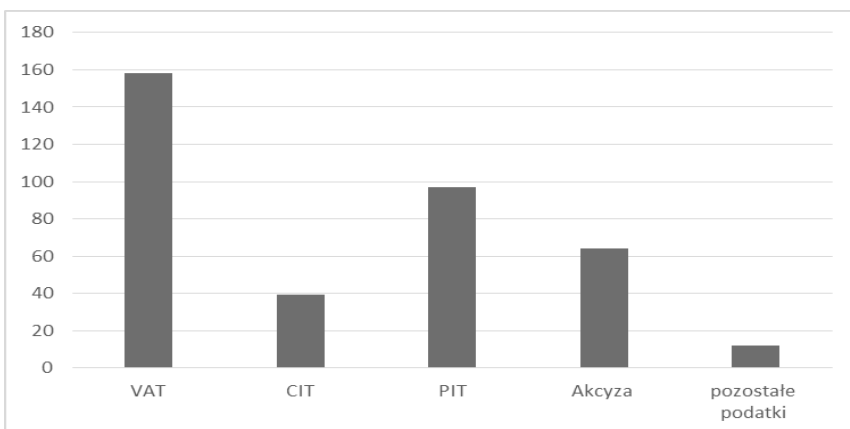
Nonetheless, it is worth bearing in mind that 'it is against the law to act contrary to the statue, and it is fraudulent to act within the statue to bypass its intended purpose' (Stanik, 2008, p. 50). In consequence, the difference between tax optimization and tax fraud is drawn by a thin line. The concept and scope of tax fraud as a crime or a fiscal offence has been defined in penal fiscal code. As a rule, it is a criminal offence. According to this legal standard, a taxpayer who either refrains from reporting the subject of taxation or the tax base or does not submit their tax statement to a competent tax authority causes tax depletion (art. 54 of Penal Fiscal Code). What is more, a taxpayer who uses another person's name, another company's name or trademark to

conceal their own economic activity, or the size of it, thus causing tax depletion (art. 55 of Penal Fiscal Code), subsequently making false claims or withholding the truth; or does not fulfil the obligation to report relevant changes to the authorities, thus causing tax depletion (art. 56 of Penal Fiscal Code), is punishable by a fine, or imprisonment or both. Financial penalties are mainly applied with reference to tax crimes and tax offences in line with Penal Fiscal Code. Fines and tickets have proven to be an exceptionally useful instrument of fiscal criminal policy (Melezini, ed., 2010, pp. 275–276), an adequate reaction to the violation of tax regulations, as the offender is punished by a fine of the same nature as the actual depletion or its likelihood they have caused. In addition to that, a fine fits well into the fiscal character of the Penal Fiscal Code, as it provides an additional source of state revenue and is relatively low-cost in execution in comparison to imprisonment, not generating extra costs for the state (Nalikowski, 2016, p. 217).

The VAT gap

Based on the analysis of budget revenue it is safe to say that the VAT tax is the most important source of income for the state. Consequently, the volume and the stability of the proceeds are extremely significant. The structure of budget revenue from taxation is presented in Fig. 1 below.

Fig. 1. Budget revenue from taxation in 2017 r. (in billion PLN)

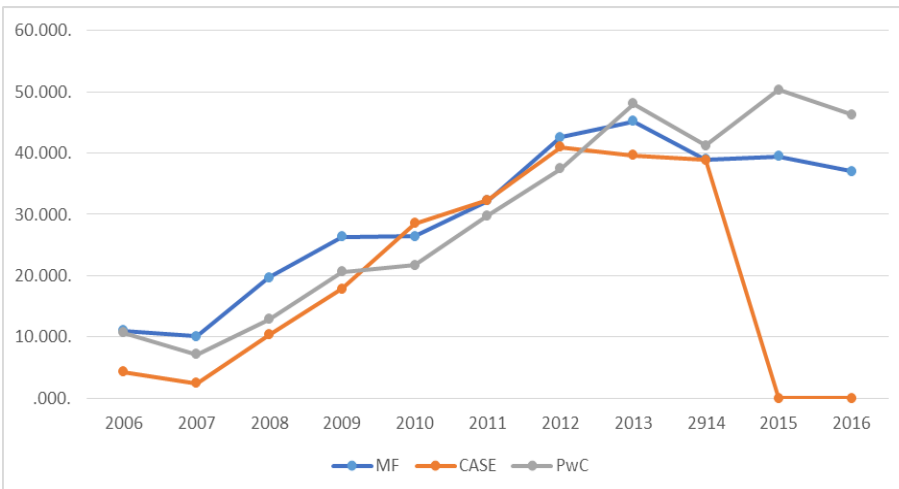


Source: Author's own elaboration on Ministry of Finance data.

As presented above, the VAT tax is the most important source of budget tax revenues and as such has become the most popular area for tax criminal activity.

The concept of the VAT gap has not been regulated in the Polish legal system. The term has appeared in response to the phenomenon of tax depletion, and subsequently the need to keep a record of the VAT tax paid. It is defined as the difference between the amount of tax owed and the amount of tax actually paid to the state budget (Małecka-Ziębińska, 2017, p. 46). Since 2008 a dramatic rise in the VAT gap has been recorded. Hence, the budget revenues from the VAT tax up to 2012 showed a steady decline. Estimated value of the VAT gap is regularly analysed and researched by the Ministry of Finance, CASE and PwC.

Fig. 2. Estimated value of the VAT gap for 2006–2016 (in million PLN) according to Ministry of Finance, CASE and PwC data



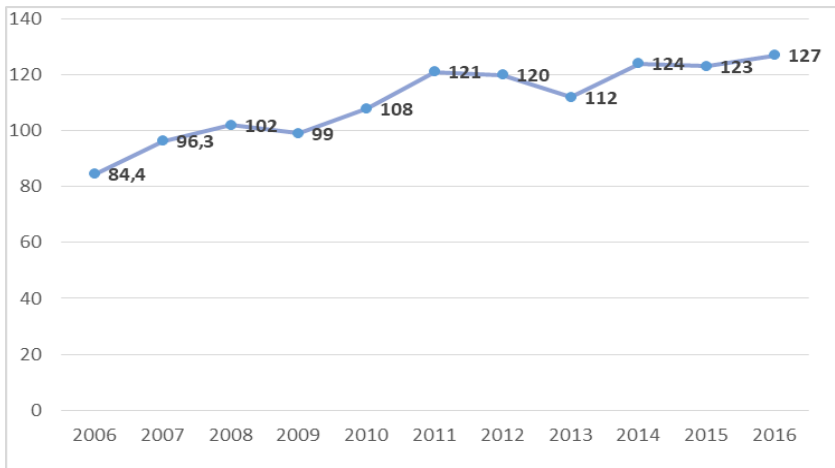
Source: Strąk, T. Analiza i ocena skuteczności realizacji dochodów podatkowych z VAT w Polsce w okresie od stycznia 2005 r. do kwietnia 2017 r., Problemy Zarządzania No 15/2 (1)2018, p. 111

The budget revenues in 2011 started to decline, following a dramatic rise in the VAT gap.

It is also worth noting that in 2011 in Poland the VAT tax rate was raised. As the graph presents, the introduction of a higher tax rate did not result in an increase in the budget revenues. Since 2011 initially the revenues continued to decrease. It was not until 2014 that the proceeds from the VAT tax began to rise. It was observed at the time that the VAT gap has a significant

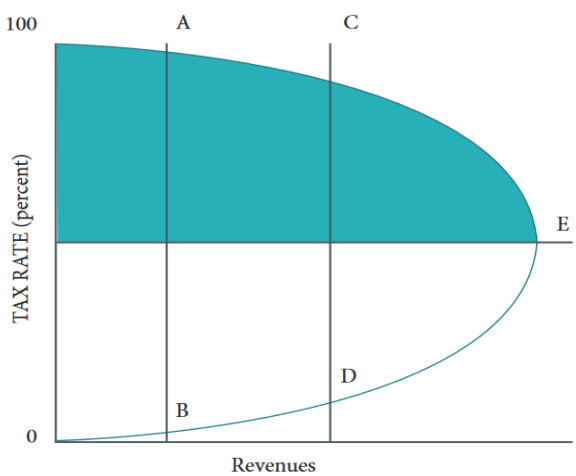
influence on the country's economy, making it both a social and a political issue. A development of a variety of tools began to reduce tax evasionand tax criminal activity in this respect. Drawing from Fig. 1 and 2, raising the tax rate does not necessarily result in a higher budget revenue volume. The opposite was recorded. The Laffer Curve Theory became applicable.

Fig. 3. VAT budget revenues for 2006–2016 (in billion PLN)



Source: Author's own elaboration on Ministry of Finance data

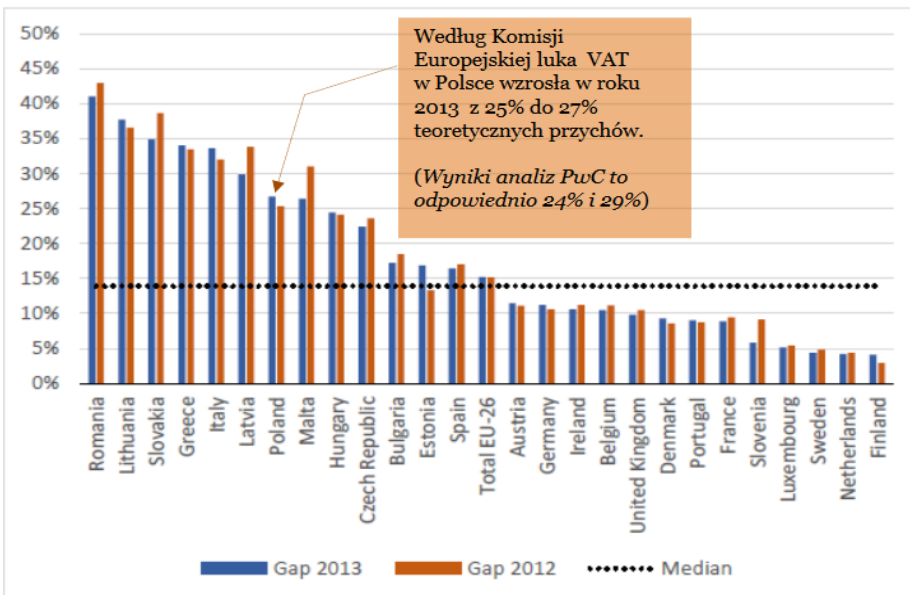
Fig. 4. The Laffer Curve



Source: Gwiazdowski, R. Krzywa Laffera. Rzecz o tym, jak obniżki stawek podatkowych mogą skutkować zwiększeniem wpływów podatkowych i vice versa. Downloaded from: https://zpp.net.pl/wp-content/uploads/2017/11/omt8r4_02.04.2014BroszuraKrzywaLaffera.... pdf (access date: 7.06.2019)

Budget revenues will rise as the tax rates rise, but up to a certain point only. At the turning point, however, raising tax rates will eventually result in a drop in revenues. This may be the consequence of an excessive fiscal approach and a reluctance on the part of some to pay taxes, or even the illegal act of tax evasion. Roman Rybarski claims that 'the source of social fiscal potential lies in a society's wealth, its production [...], a screw cannot be turned endlessly or else it will break' (Rybarski, 1938, p. 10). In relation to the VAT gap, it seems probable that the higher VAT tax rate might have encouraged tax frauds from other EU states in their criminal practices. It should be stressed that the VAT gap and VAT tax evasion are both issues present in all EU states, including Poland.

Fig. 5. The VAT gap in EU states in 2012 r.



Source: PwC (2015). Wyłudzenia VAT – luka podatkowa w 2014 roku i prognoza na 2015. Pobrano z: https://www.pwc.pl/pl/pdf/luka-vat-pwc-wrzesien-2015.pdf (published: 25.09.2015, access date: 7.06.2019)

According to the European Commission, the VAT gap in Poland in 2013 increased from 25% to 27% of theoretical revenue (PwC results quote 24% and 29% respectively). The numbers for the VAT gap in Poland are well above the EU median, but they are considerably higher for Romania, Lithuania, Slovenia, Greece or Italy. The high volume of the decrease in the VAT proceeds led to a number of actions aimed at limiting the size of the gap.

Selected Ministry of Finance tools for limiting VAT tax criminal activity

Originally, the Ministry of Finance focused its activity on reducing the tax gap to strictly legislative measures. As one of the first tools, reverse charge was introduced in 2011, by which economic entities only deal in net amounts, transferring any tax-related operations to the tax authorities. Selected groups of goods, most commonly the source of tax evasion (steel trade, and later electronics, construction material, construction services), were included in the reverse VAT charge mechanism. A buyer of goods within those categories cannot file for a VAT tax deduction. In an interview dated to March 19, 2018, Wojciech Śliż, the Director at the Ministry of Finance, claims that reverse charge fulfils its role, but is not without its shortfalls. First of all, as Śliż points out, 'tax criminal activity is highly migrant by nature, whereas the legislative process is time-consuming. Before more areas of economic activity are included in the reverse charge mechanism, criminals manage to transfer their activity to various other ones. Secondly, reverse charge in domestic trade is a breach in the construction of the VAT tax legislation. It was introduced for the want of a better, more effective measure. Currently, there are better ideas at hand. Compulsory split payment in business areas currently under reverse charge obligation together with a voluntary split payment in other areas will leave potential VAT tax offender uncertain whether their criminal plan to extort VAT will prove successful. With other instruments already functioning, such as the Standard Audit File for Tax (SAF-T), the IT System of the Clearing House (ITSCH) and penal regulations, they should be an effective enough deterrent for those planning to commit these types of crimes' (Śliż, 2018).

Higher penalties, fines and tickets resulting from Penal Fiscal Code regulations (prison sentence for a period of 25 years or a fine of up to PLN 6 million for the most serious tax offenders) have created an opportunity for more efficient preventive actions. On the legislative level, joint and several responsibility has been introduced, according to which a VAT-registered buyer is jointly responsible with the supplier of goods for their tax liabilities up to the value of the tax proportionate to the value of goods delivered to them. On the other hand, Witold Modzelewski claims that the time period for the introduction of legislative measures to curb the VAT gap 'was no better than any other time, so, frankly speaking, either nothing has actually been done to make reparations or the steps taken have been ineffective or seemingly superficial' (Modzelewski, 2017).

Nonetheless, the data for budget revenues since 2012 has shown a slight increase in the tax take. It is, of course, understandable that tax extortion should not take place as a rule, but eliminating the phenomenon completely does not seem practicable either. However unsatisfactory the final effect might seem, certain steps have been taken. Their outcome, though, was deterrence only. In result, recent years have seen a shift in the approach to one that is more determined to reduce the VAT tax gap by a significant degree.

The creation of a National Revenue Administration (NRA) seems to be yet another reasonable step towards limiting the scope of VAT criminal activities. On March 1, 2018 revenue and customs offices were merged. The underlying premise behind the decision to consolidate tax and customs authorities was acceleration of the exchange of information through a unified IT system. Since then, a joint analysis of tax and customs data has been possible owing to the fast flow of information. Thanks to the NRA among other administrative bodies, a number of 'carousel' fraud have been exposed, in which over 170 polish and 55 foreign companies have been involved, 13 members of an organized crime group have been detained, after extorting PLN 124 million on Vat and PLN 160 million of an unfounded VAT refund has been prevented.

One of the key IT solutions introduced has been the obligation to submit a Standard Audit File for Tax (SAF-T). Since January 1 2018 every VAT-registered taxpayer is obliged to submit a monthly report on VAT sales and purchases in a specified format. SAF-T reports enable various analytical methods, SAF-T_Analizer and SAF-T_Scope included. The main assumptions behind SAF-T were quick verification and identification of the so called dummy invoices, issued by non-existent taxpayers or not included in statements. Thanks to SAF-T tax offices are able to conduct up-to-date cross-checks. Before that, these procedures followed on from a formal tax inspection or verification activities. The inspection aimed to establish whether VAT deductions were correctly done and reported between the parties involved. At present, such checks are done *ex officio* and in real time, with irregularities being detected and examined through verification activities. Nevertheless, it is worth bearing in mind that submitting a standard file in a pre-set format aims to reduce the tax gap, i.e. tax evasion, VAT tax evasion and 'carousel' fraud (Fijałkowska, 2017, pp. 24-25). Thus, 'in order to seal the Polish tax system, the Ministry of Finance is transferring tax settlements into the virtual dominion. Gradually, it is imposing obligations to record VAT reports 'in the cloud' on new

groups of taxpayers in order to be able to perform mathematical data processing and identify irregularities' (Fijałkowska, 2017, p. 17).

Another IT tool implemented is the IT system of the Clearing House (ITSCH). Designed by civil servants and IT professionals together with the banking system, it is an electronic mechanism of network reporting. A series of algorithms for the analysis of banking data on economic entities, this new reporting and analysis tool is designed for a more efficient fight against tax crime through its counteracting the use of the financial sector for tax fraud. It imposes new duties on financial institutions, requiring them to regularly send reports on companies with the aim of detecting any activity potentially resulting in VAT evasion, dummy invoices, 'carousel' fraud and many others. 'The Head of the NRA will receive data on accounts classified under the ITSCH statue (excluding private ones, used for personal purposes), as well as any transactions by these entities through banking accounts listed in the system or savings-and-loan banking services (SKOK). Based on the data thus acquired, the Head of the NRA will assess the risk of tax evasion. All the data will be submitted in an electronic automated way through the clearing house' (Ministry of Finance, 2018a).

Split payment is a mechanism designed to tighten up the VAT tax system by eliminating the risk of the VAT due vanishing after being paid by one party to another, but not to tax authorities. The procedure applies to electronic payments for B2B transactions and is allowed between VAT taxable persons that have an account with a Polish bank. Under this new procedure the buyer transfers to the seller's account only the net amount shown on the invoice. At the same time the equivalent of VAT is automatically transferred to the seller's dedicated, limited access VAT account. According to the Ministry of Finance, the ITSCH has already proven effective. In April 2018 over 5.6 million qualified banking accounts have been covered with it. One of the first achievements is a speedy identification of newly established, suspicious bank accounts. The joint operational activities together with the Chief Inspector of Finacial Information (GIIF) have allowed for the retaining of a total of around EUR 350 000, i.e. almost PLN 1,5 million. 'The desired effect of the preventive measures for analyzing the risks of abusive tax practices as well as NRA's prompt reaction should be a significant reduction in taxevasion, but also an improvement in the general conditions of conducting economic activity for every taxpayer through re-establishing fair competition in the market' (Ministry of Finance, 2018b). In theory, this model might eliminate the

VAT gap. Taxpayers would have no access to the VAT paid by the buyers, thus being unable to withhold it. In reality, however, split payment is applied only to electronic transactions and the VAT gap is partly the result of business liquidation, grey economy activities or declaration errors (Śliż, 2018).

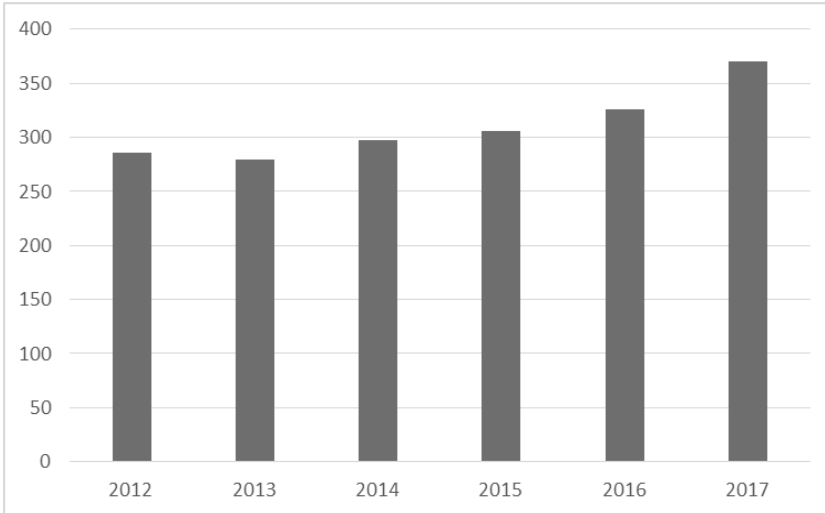
In the future, the Ministry of Finance intends to introduce the obligation for online cash registers, which will enable up-to-date reports on sales to be transferred to the fiscal administration data servers.

Conclusions

In recent years, one of the most essential activities undertaken by the Ministry of Finance has been the fight against VAT tax evasion. Many of the actions taken by taxpayers are falling short of legal tax optimization. Economic activity leading to VAT evasion is marked by organized crime groups often referred to as 'white-collar crime.' At present criminal activity is far from clandestine, hidden; nor is it reminiscent of spectacular armed robberies with police cars chasing criminals, with sirens wailing. Illegal decisions leading to tax evasion are made in the drawing rooms, with tax law professionals attending to make sure every pretence of lawfulness is upheld. They exploit ambiguities and loopholes in legal documents, with complete disregard for the fiscal law. They utilize mechanisms which tax administration finds hard to detect. Investigative specialists do their best to detect anomalies and show a prompt reaction to the illegal activities of tax criminals. Their decisions, nonetheless, are always made after the fact. Owing to a variety of legislative actions, and more recently, cyber actions, the scope of the VAT tax gap has consistently been reducing. It is estimated that by 2020 the tools already at the disposal of the Ministry of Finance, together with a further dynamic development of automated verification tools and advanced analytical IT methods, will have diminished the tax gap by PLN 6.840 billion. The European Commission recommends that continual investment in IT tools shall lead to further reductions of the VAT tax gap.

It is observable that the actions taken have already resulted in the growth of fiscal proceeds. It is worth stressing that budget revenues are not solely dependent on the tightness of the fiscal system. Poland has enjoyed a favourable economic situation and a high GDP in the last several years, which to a certain degree has also been of importance in the volume of budget revenues from taxation.

Fig. 6. Budget tax revenues for 2012–2017 (in billion PLN)



Source: Author's own elaboration based on https://finanse-arch.mf.gov.pl/strona-glowna (access date: 7.06.2019)

Pointing to the single most efficient tool in the fight against tax fraud is a challenging task, even more so as a number of them are often introduced simultaneously by the Ministry of Finance and their fiscal effectiveness can only be assessed at a later time. Some measures introduced much earlier have already delivered good results. The prospective mechanisms for the calculation and measurement of the tax gap; its potential effects, as well as the results expected of the newly introduced tool are exceedingly complex. It is equally important that the scope of the VAT tax gap be monitored on an ongoing basis, and that the effectiveness of the reduction measures taken be reflected upon for further improvement.

What must essentially be considered is that these tools should only be targeted at the criminal activities of dishonest taxpayers. It is equally of importance that honest taxpayers should be able to enjoy freedom of economic activity and not feel the oppressive weight of the taxing system and related authorities. Financial and accountancy departments point to excessive tax bureaucracy resulting from the numerous reports required of them. Adjusting the existing accounting systems to modern data transfer is as costly as it is crucial.

■ Chapter 3 ■

Planning as a Part of the Structure of Poland's Local Governments' Cooperative Potential

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Abstract: The aim of the article is to identify the main constituent parts of cooperation planning and to define their roles from the perspective of assessing levels of cooperative potential. Co-operative potential is a new area of knowledge that has generated interests among representatives of management sciences. They perceive the dichotomies of cooperation phenomena that can be analysed, not only as creating relationships, but also in the context of a process that require the planning of appropriate resources. This new trend of knowledge is a part of the concept of cooperative potential, while the objective analysis of planning aspects constitutes one of the elements of its structure. The article presents a 5-dimensional model of cooperative potential, developed on the basis of the organization concept of H.J Leavitt using the "inductive top-down theorizing concept" methodology (Shepherd, Sutcliffe 2011). The research was located in the Podkarpacie voivodship, where the subject was a randomly selected sample of 58 local government units (level NUTS5). The analysis shows that the cooperative potential of the surveyed offices is at a low level. The analysis also indicates that although the local government offices are aware of activities necessary for the preparation of such entities for the implementation of cooperation, they lack formalization and improvement in most of the criteria. The role of planning in the structure of cooperative potential is of a strategic nature. Majority of the offices surveyed have attained high levels of excellence in this area following the to fulfil existing legislative Acts. The article is one of the first studies using the model of cooperative potential as a tool for research.
Keywords: cooperation, cooperative potential, planning, local government units

Introduction

Contemporary organizations should be prepared for cooperation, as forging relationships and working together is a characteristic feature of the 21st century. The idea of inter-organizational cooperation is important from a practical perspective and is associated with the creation of new knowledge – as opposed to thelimited capabilities of individual units - which calls for the need for joint actions in various fields, not only in business (Pierścieniak, 2016). This is the analysis contemporary Polish researchers formulating new paradigms, e.g., the developed concept of the network paradigm (Czakon, 2011, Zdziarski 2016) or the paradigm of the relationship (Stańczyk-Hugiet, 2012). Others combine concepts of cooperation with regional development or innovation (Grzebyk, 2017, Bojar, Machnik-Słomka, 2014, Krawczyk--Sokołowska, 2012).

Contemporary public organizations must cooperate with each other and with external partners at many levels. The can take place both within the economic and social planes (Castanho, Loures, Cabezas, Fernández-Pozo, 2017) in the form of joint ventures (Hajduga, 2017), in the spheres of public services, as well as in the area of acquiring and using public funds (Pierścieniak 2015b). External cooperation, as an aspect of performing public tasks, which is understood as initiating, planning and implementing projects in cooperation with other local government units (Pierścieniak, Grzebyk, 2014; Zawicki, 2007), is implemented most often with non-governmental organizations, in keeping with the legislative provisions of the local government authority Act (art. 64 sec. 1) and the Poviat Self-governing Act (art. 65 sec. 1). Local development visions are supported by activities within public-private partnerships (Journal of Laws No. 169, item 1420). The European Union supports cooperation between local governments by offering financial support within the framework of integrated operational programs (Programming of the financial perspective 2014-2020 Partnership Agreement). Such activities are often described in the literature, and knowledge in this field is fully developed.

Cooperation planning is not a concept often identified in research studies. For example, in the Polish "BazEkon" database we can identify 6782 articles about cooperation, while the aspects of planning feature only 304 articles, with only 34 with the keywords "cooperation" (data from 16/05/2019). A qualitative analysis of the collected texts allows one to note that 99% of them relate to planning in the spatial dimension, focusing more on

its effects than the elements of the process, particularly when discussing the subject of collaboration. From the material perspective, it seems important to recognize the role of planning processes from the perspective of the efficiency of an operation in the field of cooperation and, in particular, in designing organizational capacity for cooperation.

In light of the above considerations, the question that seems to arise is how prepared are local governments offices for inter-organizational cooperation? What role does the planning process play in co-operative potential? The process of preparing any organization for cooperation is multidimensional, but planning should be identified as a key element of cooperation due to its primacy (Stoner, Wankel, 1996). Relying on the above assumption, the subject of the current analysis will focus on the constituent parts of cooperation planning. The aim of the article is to identify the main constituent parts of cooperation planning and to define their roles from the perspective of assessing levels of cooperative potential.

Material and methods

A contemporary organization is described through various theoretical concepts that are based on the classical system approach, treating organizations as part of an environment with an internal structure consisting of parts arranged according to established rules that define their relations. Most often, different authors treat organizations as a multidimensional system, consisting of elements that interrelate (Kardas, 2018). To understand the described model of cooperative potential, it is worth observing that cooperation is a relationship, which can be treated from varied points of view such as a process, structure, organizational form (Pietruszka-Ortyl, 2017). This approach to cooperation requires the involvement of the organization's resources.

The theoretical concept of the organizational potential model for external cooperation (Pierscieniak, 2015a), presented as a model of the cooperative potential of the organization, consists of 11 elements that were arranged, taking into account all key constituents of the organization model proposed by H.J. Leavitt (1964). It indicates 5 dimensions such as: goals and tasks (D1), technology (D2), structure (D3), people (D4) and environment (D5). By systematically reviewing global literature (taking into account the achievements of Polish literature) from 1993-2014 (Pierscieniak, 2015a); the

dimensions were designated to indicate key elements. They constitute groups of success factors for cooperation (treated in the subject context).

The following elements have been identified in individual dimensions. In the area of objectives and tasks, a single component. Namely the strategic planning of collaboration (E1) has been identified. In the technology dimension, three components were identified – the system of communication (E2), acquiring financial resources for the partnership (E3), and the decision-making process (E4). In the structure dimension, two key components such as the organisation of the collaboration unit (E5) and the assignment of tasks, duties and responsibilities (E6) have been identified. Three components, namely the process of recruiting employees for collaboration (E7), the competences and attitudes of employees towards collaboration (E8), as well as leadership (E9) were subsequently identified in the people dimension. The last dimension is the environment, in which two key components were identified, including External support for the idea of collaboration (E10) and the Goodwill of a company (E11). The research scheme constituting the model of cooperative potential is based on the inductive top-down theorizing concept (Shepherd, Sutcliffe, 2011).

One of the main components of the cooperative potential model is the strategic planning of cooperation (E1) activities (Pierscieniak, 2015, p. 96). This component in essence concerns the formulation of visions and missions, and defining a formalized strategy for cooperation. The goals and tasks related to the implementation of inter-organizational cooperation are made clear to all partners. Both partners and team members have a knowledge of the course of action of each individual, strategy; and their tasks, roles and responsibilities. The goal of cooperation, which differs from the goals pursued in the organization, is defined and accepted by the partners.

The measurement of the occurrence of a component of the strategic planning takes place, based on a scale which was described as achieving individual levels of excellence in the process of planning cooperation. It was assumed that level 1 represents a lack of awareness in creating a cooperation plan; while level 2 represents a state of awareness (discussions, informal planning); level 3 - the formalization of cooperation (definition of internal regulations, clearly defined goals, documentation, budget. Level 4, on the other hand represents actions, i.e. the dissemination of cooperation goals at the individual level and in the environment; level 5 - the evaluation of the planning process, i.e. the mechanism for monitoring and evaluating objectives and

cooperation plans, employee participation and continuous updates. The levels determined in the measurement methodology are simultaneously the measurement scales, where a given level is implemented when the previous one has been achieved (Zawicki, 2004; Pierscieniak, 2015a).

For the analysis, the aggregated measure was used for all elements of the cooperative potential defined as the synthetic index of cooperative potential. A median was used to calculate it, interpreting it as an average value for the results obtained.

The planning component (E1) was tested using a questionnaire that was part of the cooperative potential measurement questionnaire. In the survey, the table for element E1 contained 11 questions describing the 5 levels being tested. The questions were tailored to the context of the cooperation under study, based on the recommendations of the methodology of examining the organization's potential for external cooperation (Pierscieniak, 2015a).

The research was carried out on 04/05/2018 in 58 randomly selected local government offices in Podkarpacie province. The quantitative structure of the sample was similar to the actual set of entities and the following configuration for rural (51%), urban/rural (28%), urban (19%) local governments, representing the real configuration 68%-22%-10%, respectively. The final sample size results from data access.

Findings and discussion

The diagnosis of the cooperative potential indicates that the surveyed local government offices of the Podkarpackie Voivodeship are not well prepared for inter-organizational cooperation (Figure 1). The synthetic index of cooperative potential has been estimated at level 2 (median), which means that the offices surveyed are, on average, aware of activities related to the preparation of the office for cooperation. But these activities have not been formalized or improved upon in most of the criteria.

Although the synthetic index, determined using the median, is not an excellent measure for the level of individual components, it does allow for an estimation of the overall level of the cooperative potential of the organizations covered in the study. When conducting a qualitative analysis of the structure of synthetic factor components, it can be observed that components E2 and E3 were estimated based on the set of 11 components at level 1. The low level of E2 characterizes the examined offices as organizations that do not attach any

importance to the communication process. The lack of proper (in the form) and effective communication can be an element hindering the implementation of cooperation and achieving the intended goals (Danik, Gołębiowski, 2014; Bryła, 2012; Poradnik MpiPS, 2007). Low level of E3 "Gaining financial resources" for the partnership proves that the offices do not attach importance to raising funds for cooperation, although this argument often appears in publications as a factor hindering the implementation of cooperation in a given organization (Davey, Baaken, Muros, Meerman 2012; Pierscieniak 2015b; Galan-Muros, Davey, 2017; Tarhini et al., 2015).

Figure 1. Profile of the cooperative potential of selected local governments from Podkarpacie

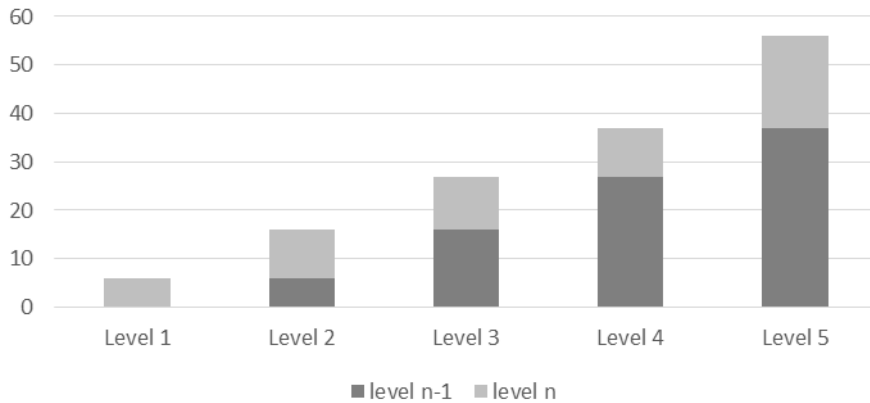
Source: own elaboration

As many as 7 potential components were estimated at level 2 - awareness. At this level, all the components of the structure, relating to the organization of the cooperation unit and the division of tasks and responsibilities were included. One of the important components in this area, which researchers pay attention to, and which is important for the success of cooperation, is the flexibility of organizational solutions (Cygler 2008; Détienne 2006; Małkus, 2013). Another component diagnosed in the structure of potentials at a low level are people. The low level of D4 proves that none of the components

relating to the selection of employees for cooperation, the shaping of competences or attitudes and activities related to leadership in the majority of assessed offices, is sufficiently formalized or evaluated. This conclusion is important in the light of the concept of human capital, which is the basis for the development of each organization as the employee competences in the area of performed tasks are identified as strategic components (Paauwe, Boon, 2018; Wood, 2018). In the analysed component set, E10 has been identified at level 2. This concerns the preparation of an organization to exploit external support for the idea of collaboration. In the majority of surveyed offices, no good practices of building awareness related to seeking opportunities to support cooperation were identified. Offices operate routinely using known procedures while duplicating standard behaviours.

The planning element (E1) may be interpreted differently depending on the evaluation method used. The general analysis shows that the arithmetic average of 3.5 is between levels 3 and 4. By calculating the median value, level 4 was obtained, based on which one can conclude that the planning of cooperation is in the units under study at a high level. It consists of the significance of planning cooperation, popularized by the chief executive, especially in the area of accomplishing set commissioned tasks. Its formalization through the creation of plans, regulations and other documentation consisting records of activities in cooperation as well as its formal rules are important components. Level 4 also includes the identification of clearly defined goals and budget planning. The measure of excellence at this level involves spreading the goals and directions of cooperation not only at the office level but also in communication with the environment. A slightly different but equally high result of the level of cooperative potential for the studied group is obtained by calculating the dominant value, which is the most frequent figure in the test sample. As much as 33% of the surveyed offices for the E1 component attained level 5, which means that it has, besides accomplishing activities from levels 1-4, started to formulate monitoring of rules and price implementation for communal cooperation programs with external entities as well as their formalization. On at least one occasion, they modified the website. An important component in this area was employee participation, which was declared in the research. The size of the test sample for component E1 was, at particular levels of excellence, very diverse (Figure 2).

Figure 2. Number of offices with a defined level of excellence for element E1 - Strategic planning of cooperation



Legend:
Level 1 - Lack of awareness in creating a cooperation plan.
Level 2 - State of awareness (discussions, informal planning).
Level 3 - Formalization of cooperation (documentation, budget).
Level 4 - Dissemination of cooperation goals.
Level 5 - Evaluation, monitoring, updating.

Sources: own elaboration

A qualitative analysis of the results obtained in terms of good and bad practices used in offices, revealed that 13% of the surveyed units did not carry out any discussion at the level of the local government council; at least twice, on the formal building of relations with the environment. In 13% of the examined offices, there are no internal regulations defining the forms and areas of cooperation with other local government units or other entities. The analysis of the survey results shows that 9% of offices do not have clearly defined objectives of cooperation, and 5% of municipalities do not have documentation related to the implementation of any given type of agreement. Financial resources for the implementation of cooperation were not included in the budget of 2018 in 4% of the examined offices. As much as 21% of the surveyed entities declared that they do not promote the objectives and directions of cooperation with the environment among office employees, while 23% admit that the goals and directions of cooperation are not shared on their websites. There is no publicly available information on the current directions of cooperation that could encourage other entities to cooperate. The

research shows that 27% of offices do not have formulated rules for monitoring and evaluating the implementation of the local government's program of cooperation with external entities.

As many as 32% of offices declare that they do not modify or update the objectives or directions of the local government's cooperation with the local environment; nor do they incorporate such provisions into their strategic plans. As many as 41% admitted that they do not provide information about the changes or updates of employees' cooperation goals. Every third surveyed office acknowledges that it does not update the website with new information related to the modification of directions and forms of cooperation. The above analysis shows that most offices have visions of cooperation and awareness of obtaining partners from the environment. This is necessary for the implementation of own tasks and activities in accordance with the provisions of the Local Government Act of 1990.

The Pearson correlation, coefficient for level E1 between cooperation planning and the level of cooperative potential, is $r_1 = 0.47$, which indicates a very moderate relationship. The coefficient of determination for the cooperative potential is $r_1^2 = 0.2209$, which means that about 22% of the variability of the cooperative potential is explained by the variability of the level of cooperation planning. A similarity exists in the correlation for level E1 between planning cooperation and the subjective evaluation of experience in cooperation, for which a correlation result $r_2 = 0.45$ was obtained. The greater the experience, the greater the excellence in planning cooperation identified in the studied group of local governments in Podkarpacie province.

Conclusions

Planning in the cooperation processis a central consideration. It is treated by researchers as a strategic element; and it is, in this context, diagnosed in the concept of cooperative potential. The research shows that despite the low synthetic index of the cooperative potential of the surveyed offices from Podkarpacie Voivodeship, the strategic planning component of cooperation (E1) is developed relatively high. In analysing the level of E1 excellence, it is worth noting that most offices are not only aware of this process, but also take care to clearly define the objectives for their communication with the local environment. One of the key components that can be improved here is internal communication, better information from the about plans and goals of

cooperation; as well as any changes that may have taken place. Another important conclusion here is the low level of the synthetic index of cooperative potential. Many elements related to the success of cooperation are not implemented, and this requires further research and analysis.

■ Chapter 4 ■

Cost Accounting as a Source of Management Information in Units of the Territorial Self-Government

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Abstract: Cost accounting is a branch of accounting which deals with the topic of determining costs of the activity conducted by economic entities. The information concerning the costs of the performed activity has a significant meaning while managing the unit of the territorial self-government as well as increasing the rationality and effectiveness of public expenditure. Currently communes mainly focus on spending public funds in accordance with the law and fulfilling reporting duties within the scope. The aim of the article is an attempt to indicate the role of cost accounting in providing information that aims to increase the effectiveness of the public spending.
Keywords: cost accounting, commune, efficiency, information

Introduction

Aiming at improving the economy and efficiency of using public funds does not lie within the scope of interest of basic units of the local self-government. This occurs for many reasons. One of them is due to a lack of proper information systems providing full and reliable information for management purposes. It also concerns the costs, the accounting of which in communes is focused on generating information for the purpose of obligatory reporting.

The aim of this article is to attempt to indicate the role of cost accounting in providing information that aims to increase the effectiveness of the public spending. To this end,the analysis of the subject literature and legal acts was conducted. Some empirical research was also carried out in the

communes of Siedlce and Ostrołęka's subregions, the purpose being to get to know the opinions of the heads of communes, treasurers and secretaries concerning the significance of cost accounting in increasing the efficiency of the activities of the units under their management.

Efficiency of communes

As mentioned at the beginning, the need for public funds expenditure to be subjected to the efficiency conditioning, which may be defined as a relation between the costs (spending) and the achieved effects (the quantity of the public good). Despite the fact that most of the information included in the writings is of a postulatory character, it can be treated as the indication of a novel approach to the subject of the effective spendings of the public funds (Kachniarz, 2013).

The subject literature does not provide a unified approach concerning the way of defining efficiency. Beginning with the topic of efficiency, it is necessary to quote a definition formulated by V. Pareto who stresses the condition for efficient resource reallocation, wherein the condition is fulfilled if there is no possible resource reallocation, which will make at least one person's situation better without making at least one individual worse off (Stiglitz, 2004). The condition formed by the definition is extremely difficult to fulfill in reality, which results in the limited possibility of applying it in order to conduct analyses on the efficiency of the basic units of territorial self-government. (Skica, 2012). Kaldor-Hicks claims that efficiency occurs when one individual gains more than the other one loses. At the same time there is a concept that those individuals that are made better off could in principle compensate those ones that are made worse off. (Buchanan, Tullock 2004, Skica, 2012).

The considerations presented above allow us to distinguish a common relation between the costs and the effects. This relation was used in Farrell's efficiency measure, which deals with two approaches to define efficiency. The first one consists of maximizing the results at a given input, whereas the other one describes efficiency as minimal input necessary to achieve the set goals (Farrell, 1957). On the basis of the definition, A. Charnes, W. Cooper and E. Rhodes (1978) formulated a definition of efficiency of the public finance sector. According tothis definition, a full efficiency is obtained by a decision-making unit only when no position of the used input and the achieved results

can be improved without making other inputs or results worse (Kozuń-Cieślak, 2011).

While analyzing Polish literature concerning efficiency, it can be stated that it is often identified (and applied alternatively) with such terms as effectiveness, productivity and profitability. D. Perlo, M. Poniatowicz and M. Salachna (2010) claim that using notions of efficiency and effectiveness interchangeably is incorrect. The authors indicate that efficiency should be understood as a relation between the input and the effect, whereas effectiveness ought to refer to the level of the achievement of the set goals. According to Lubińska, efficiency can be determined as a relation between goods (services) provided by the fulfilling of one specific task, and those resources (inputs) that are used to produce them (Lubińska 2010). A similar opinion is expressed by Modzelewski (2009). According to Misiąg, efficiency may be defined as a state of acceptable relation between costs and the effects of using them, after the evaluation which, the options of using public funds brings the best results while performing tasks (Stankiewicz, 2006). Poland's Chancellery of Prime Minister expresses the belief that efficiency in commune managements concerns the measurement of the relation between products and inputs. That means that efficiency concerns an evaluation of the degree of the success in providing defined products at the lowest cost, maintaining a required quality. Efficiency, according to The Chancellery of the Prime Minister, is defined as a relation between the product and the results. This concerns the degree of the achievement of the objectives pursued and indicates if the delivered products contribute to the implementation of priorities and goals of public authorities. Effectiveness, on the other hand, is a relation input-result and concerns the level of the achievement of the set goal, and determines if the incurred expenditure allows to implement goals of a unit. The status of efficiency and effectiveness principles in public spending is emphasised by existing legal acts in Poland. Pursuant to the Public Finance Act of 27 August 2009, public funds should be spent intentionally and economically, taking into account the principle of efficiency (achieving the best results from given resources) and effectiveness (optimal choice of methods and measures in meeting objectives). Authors dealing with the problem of public finance, as emphasised above, have been advocating that efficiency and the use of public funds are the basic criteria in relation to which other criteria will be secondary (Owsiak 2008). The postulate indicates clearly that the existing criterion, the purpose based on legalism, does not eliminate

mismanagement. A. Szewczuk claims that we should aim at overcoming barriers making rationalisation of public expenditure difficult, indicating in turn that it is necessary to eliminate the belief which functions in the public sector that overcoming the reality within the scope is a utopian notion (Szewczuk, 2007, Kachniarz, 2013). The author also recognises the need to look for new parameters and to and improve the existing ones allowing for the application of valuation procedures concerning the activities of local self-government (Szewczuk, 2010). Despite the passage of time, there have been no changes in numerous units of territorial self-government. Still, the main criterion for spending public funds is their compliance with paragraphs, division of budget classification. To make the processes of the spending of public funds be subject to requirements of economic efficiency, it is necessary to introduce significant changes concerning the methods of financial planning, the classification of expenditure goals and measurements of actually achieved effects, incurred costs, including the development and implementation of the system of qualitative and quantitative parameters of the task fulfilment (Pomorska, 2007).

Summing up the deliberations of the quoted authors concerning efficiency, it should be confirmed that efficiency cannot be analyzed only with regard to the amount of the resources which are spent. Purpose, as well as achieved results, in the context of public service should also be taken into account. The evaluation of the efficiency of public spending ought to be strictly connected with determining the relations between the level, the structure of the resources spent, and the real benefits obtained by society as a result of the expenditure (Jastrzębska, 2016; Szołno, 2017). Efficiency means achieving set goals, bearing in mind the fact that it is necessary to maintain the best relation between costs and the achieved effects.

Effectiveness, on the other hand, is obtaining set goals, which makes expenditure a secondary issue. Some systems define effectiveness as activities aiming at achieving goals by any means (Świeraboda, 2014).

In order to be able to implement all the postulates formulated by the authors above, it is necessary to introduce new management methods and instruments which may include: multi annual planning, internal audits, multi annual financial forecast, managerial control, activity-based budget and participatory budget (Poniatowicz, Dziemianowicz, 2017). They allow for the measuring of the efficiency of fulfilled tasks and the evaluation of the level of society satisfaction with the provided goods and services (Filipiak, 2011). It needs to be emphasized here that among all the mentioned management

instruments, the absolute minimum which must be fulfilled in order to implement the measurement of the efficiency of the costs is the change in the mechanism of budgeting. There is a need for a shift from the existing budget administration to an activity-based budget.

An activity-based budget, unlike the traditional one, emphasizes not only the allocation of public funds, but also the evaluation of the efficiency and effectiveness of the implemented public tasks, to which the funds were allocated (Szolno, 2017).

In order to be able to apply the activity-based budget, units of the local self-government should adjust the accounting system to its needs. The system ought to provide information concerning occurring management processes, services and total costs connected with their execution. Without the constant provision and processing of information, the system would not support the functioning of a unit. Only a full, reliable and credible information is the basis while making all the decisions. It is essential to agree with O. Szołno (2017), who states that there is a need for the increase in the role of the system of budgetary and management accounting in the units of local self-governments, to include the appropriate cost accounting.

Cost budgeting

The subject literature defines costs as a cash (value) reflection of the intensity of human labour and objectified labour, occurring due to the activities of an economic unit (Jaruga, 1979). The connection between costs and economic activity indicates the purpose and equivalence of the consumption. This explains why costs should be defined as a valuable, purposeful use of tangible and intangible resources and human labour; as well as incurred expenditure, which does not reflect the consumption, incurred over a period of time in order to achieve present and future benefits (Wakuła, 2013). Therefore, costs are the category which is acknowledged socially and economically (Burzym, 1971), and each economic activity requires to undergo a constant control and evaluation (Kożuch, 2013). The process, aimed at determining the costs of conducting an activity consisting of evaluation of the value of the used resources of a given organisation, is referred to as cost accounting (Nowak, 2003).

Cost accounting was established in the enterprise practice during the industrial revolution. Its basic task included the calculation of the real and full cost of one product (Nowak, 2015).

Cost accounting is a relatively selected subsystem of the information system of accounting for an economic unit, in which there is the processing of information in accordance with the accepted model.

Scientific writing concerning cost accounting provides numerous definitions of the notion. The first and the most detailed one was given by Z. Fedak (1962), according to whom, cost accounting includes all the activities aimed at reflecting the processes of supply, production and sale occurring in the enterprise via collecting, grouping and interpreting in accepted sections. In turn, the costs of producing and selling products made by the activity of the enterprise are measured quantitatively and by their value over a particular period of time in order to achieve the most versatile information necessary to establish the results and to manage the enterprise or its team. Cost accounting is also defined by J. Matuszewicz (1994) in a similar way. He reckons that cost accounting consists of all those activities looking to establish in various sections and aspects, a level of intensity of human labour and objectified labour occurring in an enterprise over a particular period of time and with a specific purpose.

A modern definition of cost accounting was formulated by M. Walczak and M. Kowalczyk (2010), according to whom it is a process in which research and transformations concerning information on the costs of organizations serving users to evaluate the situation, make economic decisions, and control their execution are conducted in accordance with the accepted model.

A particular usefulness of cost accounting in the management process is emphasised by D. Sołtys. Who claims that cost accounting is a collection of information on costs developed according to a specific model adjusted to information needs of information users selected from the information system of an economic entity. Costs calculation and their transformation conducted in cost accounting aim at enabling users to evaluate the situations when decisions are to be taken, making decisions and control of their execution. (Perwszy--Kwinto, 2010).

While analysing the presented definitions, it may be possible to indicate characteristic features of cost accounting. They include:

- the purpose of carrying out cost accounting - providing policymakers with information necessary to evaluate the situation, make decisions and control their execution,
- object of cost accounting - economic processes taking place in a unit,
- subject of cost accounting - an economic unit,
- methods of cost accounting - recognition, grouping, transformations and interpreting,
- periodical presenting and interpreting financial aspects of economic events,
- using natural units along with financial meters.

The most important elements of cost accounting include: records of costs, settlement of costs, calculation of unit costs as well as documentation, planning, cost analysis and reporting. Therefore, it can be stated that cost accounting provides multisectional information enabling the acquisition of knowledge on the level of *ex ante* and *ex post* costs.

In communes, the main task of cost accounting is to provide information characterising costs in the sections which are useful for the needs of managing their activities, and particularly in terms of managing the execution of tasks, and controlling and conducting economic analysis of the achievements in an effective and rational way.

The necessity to meet various information demands with the use of cost accounting led to the situation in which a lot of its types and varieties came into existence (Nowak, 2001).

Initially, the business practice developed absorption costing (full-costing) and variable costing. At the end of the 20th century, new concepts of cost accounting came into existence, including activity-based costing and target costing.

The main feature characterising absorption accounting is the division of all the costs incurred in a particular organizational unit into direct and indirect ones. This type of cost accounting is used most frequently in a basic unit of territorial self-government. At that moment, it is necessary to disagree with the statement of G. Bucior, who claims that in the system of budgetary tasks of units of territorial self-government, full-costing is the one which fulfills information needs to the greatest extent. Although it allows the communes to carry out their duties concerning obligatory reporting, the usefulness of the

information derived from it for management purposes is limited. Basic units of the local self-government draw up a profit and loss account in a comparative version, which is the consequence of the existing obligations covering cost accounting (so-called accounts under group 4). This results in a lack of information concerning particular types, varieties of economic activities and organizational segments and costs of the performed tasks. Some information shortages may be eliminated by introducing cost entries in the charts of accounts 5 (Wakuła, 2013). It does not change the key problem resulting from the nature of full-costing, i.e. the obtained cost of the delivered public good will be averaged in case they are diverse at a high share of indirect costs in total costs.

Taking into account the specifics of the activities of units of a local self-government, it may be stated that applying variable costing, activity-based costing and target costing for management purposes in units of the local self-government is reasonable.

Variable costing is a type implemented by units of territorial self-governments, and particularly segment reporting (Rokita, 2018). In this type of costing, all costs can be described as either fixed costs or variable costs. The form of establishing costs of the product is only based on variable costs of its production. This kind of cost accounting is connected with the contribution margin, which informs what value is left in terms of revenue from the sale after subtracting the variable costs to cover the fixed costs and generated profit (Nowak, 2009, Rokita, 2018). The usefulness of the contribution margin in units of the local self-government is strongly limited. However, knowledge about the way in which costs react to changes in the scope of activities must be considered a significant item of information derived from this type of accounting. Cost accounting may be used while evaluating responsibilities for costs. It is known that decision-makers have a completely different influence on variable costs than on fixed ones.

Activity-based costing was created to redress the imperfections of full costing, allowing for the review of incurred costs in an organization: giving wider possibilities to analyse them and indicating the sources of their formation, which may contribute to a lowering of the costs. This type of accounting concentrates on a more detailed indirect costentry, whereas direct costs are still recognised in the products and services on the basis of documentation (Sadowska 2015). Owing to activity-based costing, it is possible to reveal and evaluate the existing and anticipated costs of activities and

processes. This contributes to the fact that it is possible to conduct a more detailed calculation of the costs of the production and profitability of particular products, services to clients and operational units (Kaplan, Cooper, 2002) in comparison to traditional cost accounting. Adaptation and implementation of activity-based costing in units of the local self-government is a reply to more and more common need for the reduction of activity costs without the necessity to lower the quality of services.

There has been a noticeable increase in the uptake of activity-based costing and the possibilities of its implementation since the time that activity-based budgeting was introduced for the purpose of increasing efficiency of the use of public funds. Despite the fact that units of a local self-government do not have to draw up an activity-based budget, some of them do so voluntarily. Regardless of the type of created financial plan in units of the territorial self-government, activity-based costing undoubtedly provides a lot of valuable information for management purposes. Using its assumptions in units of the local self-government may be a good solution, taking into account the fact that there are going to be changes introduced pertaining to activity-based costing (Wakuła, 2013). It should be emphasised that the biggest benefit of the use of activity-based costing is the possibility to get to know not only the costs of the supplied public good but also their components, i.e. such activities that are necessary for their creation. According to A.J. Kożuch, it is extremely significant in the case of subjects using public funds as it requires compliance with the discipline of spending, and so as to limit misuse (Kożuch, 2010).

The possibilities of taking into account the demand reported by prospective stakeholders and bearing in mind their needs in the process of cost calculation are also stressed by target costing. R. Cooper was the first to define target costing in 1992. According to Cooper, this model of cost accounting is a method based on establishing the costs of the production of a product so as to enable an economic entity to achieve the targeted level of profit. T. Tanaka, on the other hand, defines target costing as an effort required in a form of planning and designing the new product which aims at achieving a particular level of the production costs previously determined by the management. The definition directs that target costing is not only a method of calculating costs but also a management tool aimed at cost reduction. Similar definitions of target costing are provided by Y. Moden and K. Kamada, according towhom, it is a system supporting the process of cost reduction, which is applied during

planning, designing of a new product and preparing changes concerning products offered on the market.

On the basis of the mentioned definitions, it may be stated that target costing applies a completely different approach to cost establishment and the prices of new products. With more traditional methods, costs were determined during the production phase on the basis of the actual use of resources (Sobańska, 2002). In such a case, costs are the initial value and are the starting point to determine the sale price and calculate the level of profitability. However, in target costing, costs of the products are variable and depend on two categories: sale price and the level of targeted profit. In the units of a local self-government, following the specifics of the activities, the relation should be the answer to the question: what can be and what should be the cost of production for the organization to fulfill the needs of stakeholders at the highest possible level, at a guaranteed relatively low-cost level in the whole life-cycle of offered public services (Kożuch, 2012).

The presented deliberation may conclude that cost accounting is an essential element of the system of economic information in each economic entity. Existing models of cost accounting are subordinated to the particular informational needs of stakeholders of economic entities. At the same time, they fulfill the need for information resulting from various decision-making situations.

Results and discussion

In order to fulfill the objective of the article, empirical research was conducted in communes of Ostrołęka-Siedlce subregion. The choice of the area was dictated by their specifics. They are part of the Masovian province described as the voivodship of the greatest contrasts. General indicators calculated for the whole province do not reflect the real situation in the studied subregions. To characterise the studied subregions, the following features were selected:

- Total income in PLN per capita,
- The number of economic entities
- The number of inhabitants,
- Population per km^2,
- The area in km^2.

Analyses on the basis of the above features were conducted using standard measurements: minimal and maximal value, the median, variation coefficient. The results are presented in Table 1.

Table 1. Characteristics of the studied communes

Characteristics	N	Me	Min	Max	V
Total income in PLN per capita	88	4294,40	3630,22	6660,16	9,6%
The number of economic entities	88	622	194	7801	115,1%
The number of inhabitants	88	5276	1679	22656	61%
Population per km^2	88	40	19	1071	201,6%
The area in km^2	88	119	10	371	45,6%

Source: Own elaboration on the basis of the data from Local Data Bank

On the basis of the data presented in Table 1, it is possible to state that half of the studied units achieve income per capita at 4294,40 PLN and lower. The lowest income per capita amounted to 3630,22 PLN and the highest – 6660,19 PLN. The lowest number of economic entities in a commune was 194 and the highest - 7801. Half of the studied communes have at least 5276 inhabitants. Maximal number of inhabitants in one of the studied communes amounted to 22656. The lower area of the commune in Ostrołęka-Siedlce subregion is 10 km^2.

While evaluating the diversity of the presented characteristics in the studied communes using the coefficient of variance for measures of location, we can state that nonuniform features of the analysed communes include: population per 1 km^2 201,6%, the number of economic entities 115,1%, the number of inhabitants 61% and the area in km^2 45,6%.

The conducted research was addressed to the heads of communes, treasurers and secretaries. It aimed at acquiring knowledge pertaining to the applied methods and accounting tools implemented in order to increase the efficiency of managing available resources. 89 surveys were conducted and the responses were provided by 15 secretaries and 73 treasurers (only in one commune was it possible to carry out a survey both with the secretary and

the treasurer). Heads of the communes, when asked to answer the questions in the survey, delegated the task to secretaries pointing at their competence.

The respondents were first asked about the development of their professional careers. On the basis of the research, it can be stated that 86% of the secretaries had worked in the public sector at the beginning of their careers, the others started their professional path in the private sector. Analysing the work experience of the secretaries, it can be pointed out that 67% of them were connected with the public sector at the beginning of the career. The other 33% worked in the private sector before the started work in communes. It may have an influence on the process of dissemination of solutions and tools from the private sector to the public one.

In order to be able to increase the efficiency of the use of the budget assigned, it is necessary to introduce new management methods and instruments. The absolute minimum within this scope is the implementation of the activity-based budgeting. It will provide units of the local self-government with clear information concerning the allocation of the public funds. It is a financial plan understandable for everyone; owing to which the individuals implementing it will know what budget resources are allocated to what. Unfortunately, in the communes of Ostrołęka-Siedlce subregion, the model is underestimated. 90% of the communes still use traditional budgeting methods. There is also another alarming phenomenon: among local self-governments conducting economic activity on the basis of the traditional model of budgeting, only 2 units are willing to implement activity-based on short-term budgeting. This means that both commune authorities and the treasurers of these communes notice its positive sides and understand the significance of the efficient spending of public funds. It should be emphasized that the treasurers of these communes began their career paths in the private sector. Thus, the result is that they know the significance of the efficient use and management of the funds which are available to them.

Interesting results are also provided by an analysis of the statements from a commune from the Siedlce district where the answers were given both by the treasurer and the secretary. The particular commune does not apply modern management methods. The treasurer is against their implementation, whereas the secretary supports the basic principle. This may indicate a low level of awareness or commitment on the part of the commune accounting officer to embrace efficient and effective task execution.

While analysing activity-based budgeting, taking into account the type of the unit of the local self-government, it may be stated that mainly rural communes implemented it. The level of income per capita in the units is not the highest. Therefore, the statement expressed by many local self-government officials: that activity-based budgeting should be implemented only in wealthy communes, ought to be criticised. They claim that units with a low level of income do not have enough funds for trainings and the support of consultants. Such an approach might have been justified a few years ago. Nowadays, however, drawing up an activity-based budget is much easier since the websites of units of local self-governments are full of ready-made models of this type of budgeting and there are better and more and more practical publications in the publishing market. Moreover, there exist broader possibilities for achieving financial support concerning the preparation of such a financial plan.

In order to implement the described management tool, it is essential to adjust the accounting system to its needs. It should provide full and reliable information for management purposes. The only important information generated by the system is the information about the incurred costs. It is important to conduct rational financial measures in line with the implementation of effective management. To obtain the information, it is necessary to broaden the existing scope of the costentry. Communes draw up profit and loss accounting by using a comparative option. Thus, it is essential that the costs should be accounted by nature. This fact is confirmed by the conducted research. As many as 54 units apply only and solely accounts under group 4 for cost records. In 17 communes, budget accounting is carried out only from the perspective of budget reporting, and in 3 of them, the secretaries could not determine the way of cost records. Despite the fact that it is obligatory to draw up a profit-and-loss account in a comparative form, the legislator does not forbid the recording of costs in a functional way. The Ordinance of the Minister of Development and Finance of 13 September 2017 on accounting and plans for accounts of the state budget, budgets of the units of the local self-government, budget entities, local budgetary entities, state-run specific purpose funds, as well as public budgetary entities established outside the territory of the Republic of Poland, provides a list of accounts 5, which enable costs to be grouped according to place of their incurrence, which in turn makes calculating costs easier. Thirty-six communes of the Ostrołęka-Siedlce subregion apply costs which are recognized by nature and by function.

None of the analysed units uses only the 'by function' model. The result is alarming, and means that only 35% of the studied communes apply multi-sectional costentries. It also confirms the fact that very few respondents were aware of the information capacity of the entry. Comparing the results of the research conducted by B. Filipik in 2008, it is important to emphasize that awareness of the significance of the information has been growing over the years. The analyses mentioned above show that only 3,8% of the units of the local self-government took into account the division of costs into types of the conducted activity.

The studied communes evaluate the level of budget execution by way of an analysis of the actual costs incurred and the generated profits (93%). As many as 57% of the basic units of the territorial self-government apply calculations based on the unit cost of production. The other units do not use and are not willing to use such a tool.

As mentioned in the theoretical part of the article, the authors see the need for an increased prioritising of budgetary and management accounting, to include cost accounting. Unfortunately, these are only postulates at present. Hardly any of the studied communes apply the model of cost accounting (Table 2).

Table 2. The use of cost accounting (ca) in the studied communes

Type of cost accounting	The number of communes which apply ca	The number of communes which do not apply ca and do not want to	The number of communes which do not apply ca but are willing to	No information concerning the implemented ca
Target costing	24	61	1	3
Activity-based costing	32	50	4	3
Variable costing	16	68	2	3

Source: Own elaboration on the basis of the conducted research

On the basis of the data presented in Table 2, it can be claimed that the costing which is applied by the greatest number of communes is activity-based costing. Owing tothis fact, communes will be able to apportion indirect costs to objects of calculation. It should be noted that among 32 studied units of the local self-government applying activity-based costing, only 4 record costs by

function. The other communes use only and solely the 'by nature' model. The positive fact is that these 4 analysed units are willing to implement activity-based costing. It may be applied not only in the case of calculating activities and activity-based budgeting, but also in determining the real costs of the services provided by the commune.

Conducted analyses indicate that the methods and tools aimed at increasing the efficiency budget appropriations are applied in the studied communes to a limited extent. It ought to be emphasised that respondents mentioned reduction and a better cost control as the most important benefit of the implementation of cost accounting (Table 3).

Table 3. The benefits of cost accounting

Benefit	Number of communes	Percentage of the studied communes
Better reduction and cost control	76	86%
Better quality of the provided services	65	75%
Increase of credibility of an institution	64	74%

Source: Own elaboration on the basis of the conducted research

On the basis of the data presented in Table 3, it can be claimed that representatives of the studied communes also indicated a better quality of the services provided by the units as another benefit of cost accounting, and lastly - the increase of the credibility of an institution. The results of the analysis are encouraging on the one hand as they may result in the implementation of cost accounting in the future. On the other hand, however, after analysing the responses about barriers concerning the introduction of the instruments, the answers of the respondents of 6 units should be pointed out (7% of the responses). They indicated that the unwillingness to implement cost accounting was caused by lack of possibility of its practical use. As the main obstacles, they mentioned lack of time (35% of responses). They also indicated lack of financial resources but less frequently.

Conclusions

Efficiency is the main rule of use and management in each business entity. Due to that fact, basic units of the local self-government should wish to

improve the efficiency of all the activities as an essential condition for the development. To be able to achieve that, there is a necessity to search for new solutions in this regard. One of them is to implement cost accounting whose significance increased while applying activity-based budgeting. It is, undoubtedly, the most important area of the modern management accounting. Economic entities, including basic units of the local self-government, which want to keep up with the emerging competition have to take into account additional costs as a result of undertaken activities. Therefore, costs should be recognized both retrospectively and prospectively (Nowak, 2015).

Cost control ought to be one of the priorities of the management of a particular business entity. It comes down to the fact that it should be done in such a way to achieve a maximal value of resources of a given subject at minimal costs incurred. It is only possible if appropriate information is available. It is cost accounting that provides such information. Unfortunately, the significance of cost accounting as well as other instruments of management accounting in basic units of the local self-government is marginal. The conducted research allowed us to draw the following conclusions:

- 90% of the studied communes did not implement activity-based budgeting, which is the minimal requirement to measure and increase efficiency of the available resources.
- The calculation of the level of budget execution is carried out by calculating and analysing actually incurred costs.
- On average, 27% of the studied communes use cost accounting in their business activity. The most frequently used one in the analysed units is activity-based costing.
- 86% of the studied communes claim that better reduction and cost control are the main benefits of using cost accounting. It is a positive phenomenon which may lead to the implementation of this segment of management accounting in the future.

There is no doubt that the studied units of the local self-government do not pay enough attention to the use of information on costs and cost accounting applied by them is only used in order do generate information for the needs of obligatory reporting. The conducted research confirms the fact that the communes do not show the tendency to improve their information systems, which would be able to provide full and reliable information used in the management process. Only few communes declare to implement a selected model of cost accounting in the future.

■ Chapter 5 ■

The Concept of Sustainable Finance and the Issue of Financial Stability in Local Government Units

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Abstract: The purpose of this study is to approximate the essence and importance of the concept of sustainable finances and the issue of financial stability of local government. Nowadays, traditional finance is evolving towards sustainable and responsible finance, which approaches the issue of financial results and its components, risk and investments in a more comprehensive way, taking into account the social, environmental and economic aspects in the decision-making process. The following methods have been used: literature analysis and the method of a diagnostic survey using questionnaires. The study included local government units located on the territory of 5 voivodeships of the Eastern Poland macroregion: Lubelskie, Podkarpackie, Podlasie, Świętokrzyskie, and Warmińsko-Mazurskie. The population surveyed includes 210 local government units, consisting of 70% of urban-rural communes and cities with poviat rights and 20% of rural communes. The analysis of the obtained results allowed the researchers to discover the opinions of the main accountants (treasurers) in the area of financial stability of peripherally located local governments.
Keywords: sustainable finance, financial stability, fiscal solvency, accounting liquidity, local government unit

Introduction

The concept of sustainable development was created in the 1980s and is currently one of the most important concepts in terms of economic development. This concept has evolved and nowadays it is believed that it is particularly important to make the ruling classes aware that economic growth cannot only consist in the growth of GDP, production, employment or income, but that it also must maintain the current level of social, relational and

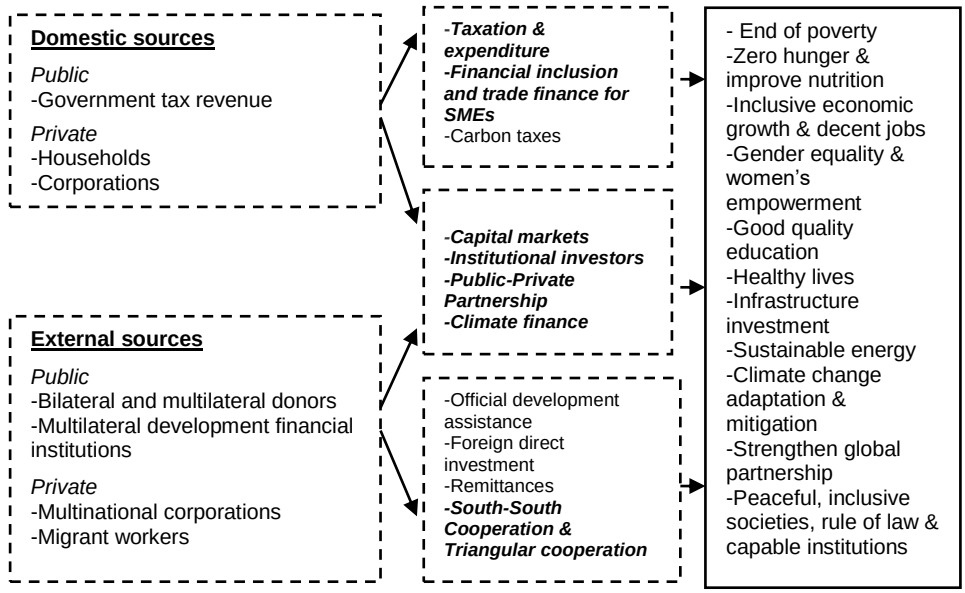
natural capital, which will ensure intergenerational justice (Latoszek, 2016, p. 26). Sustainable development signifies a certain state of relative balance between socio-cultural development, economic development and the ecosystem. One of the conditions necessary for the harmonization of development is the ability of the socio-economic system to be included, which is understood as reconciling social, economic and environmental interests, while optimizing the use of socio-economic potential (Mączyńska, 2016, p. 25). The capital base of society includes five different types of capital: financial, production, natural, human and social. The public finance system is therefore included in the financial capital component.

In the literature on the subject, the relationship between public finance and sustainable development has been repeatedly presented. Analysis of the components of the sustainable development process indicates that its implementation depends on the scope of the involvement of the financial system. This concept requires large investments, for example, in public goods, such as social services, care for the quality of water and air, and the development of other services that are the foundation of the functioning of economies and entities operating in them (Pietrzak, Dobrzańska, Kosycarz, 2016).

Currently, Europe and many other highly developed regions are moving towards the implementation of the concept of sustainable development, which is associated with the idea of sustainable finance (Figure 1). Public finance comprises processes and instruments for collecting and spending funds by public authorities. The economics of sustainable development treat public finance as a tool to achieve specific goals (Poskrobko, 2011, p. 99); (Rogall, 2010, p. 319).

The concept of sustainable finance is relatively new and less widespread, however, it is strongly becoming more and more important (Alińska, Frydrych, Klein, 2018, p. 28). The idea of sustainable public finances proclaims that they should comprehensively stimulate sustainable development by contributing to the achievement of the greatest possible number of sustainable development goals (economic, social and ecological) while maintaining neutrality in the context of other objectives. Building an internally stable public finance system is no longer the only challenge, as it is also important to skilfully apply an appropriate fiscal policy to stimulate many non-financial domains simultaneously (Cieślukowski, 2017, p. 12).

Figure 1. A schematic view of the sources of financing for sustainable development



Source: Sustainable Development Financing: Perspective from Asia and the Pacific, United Nations Economic and Social Commission for Asia and the Pacific, 2014, p. 9

In the subject literature, a general definition of financial stability is often presented, which describes it as a state in which the financial system is able to perform its functions in a continuous and effective manner, even in the event of unexpected and unfavourable disturbances on a considerable scale and a low probability of occurrence (Report on the stability of the financial system, 2018, p. 4). In a similar convention, connecting issues of stability with the functional capacity of the system, the fiscal stability of the public sector and the public finance sector is defined as the ability of the organizational units included in these sectors to provide public services, without prejudice to the possibility of providing them in the future (Navarro, Rodriquez-Bolivar et al., 2016, pp. 3961–3975). More precisely, financial stability is defined as the ability to provide services and meet current financial obligations, and in the future to maintain it without the necessity to cause a continuous increase in debt (IFAC 2012 and CICA 2009). In general, the goal of sustainable public finance, including local finance, is to avoid insolvency of public finance sector entities (Neck, Sturm, 2008). This entails a need to shift from excess economy to moderation economy - also in terms of debt. The economy of moderation

entails, in the opinion of G.W. Kołodko (G.W. Kołodko, 2014, p. 172), adjusting the size of human, natural, financial and material streams to the requirement of maintaining a dynamic balance. Public finance at every level should strive for long-term balance, which does not necessarily mean a complete lack of debt, but only bringing its amount to a safe level (Wyżnikiewicz, 2010, p. 6).

In the International Accountancy Standards Board (IASB), developed by the International Federation of Accounts (IFAC), the long-term stability of public finance sector entities (long-term fiscal stability) is considered in three dimensions: public services, public revenue and public debt (International, 2015, p. 207)

The financial situation of local governments and the stability of public services have an impact on the country's economic development, as well as the ongoing process of the political reforms aimed at promoting efficiency, balanced budgets and financial stability (Rodríguez Bolívar et al., 2016, p. 3). The assessment of financial stability of a local government unit (LGU) is an important issue because these entities are an important part of the economic processes. In Poland, local government is not only the largest service provider but it is also a serious investor. Local government investments saved the Polish economy from the severe effects of the financial crisis; however, they also significantly led to a worsening of their financial condition (Revenue of local government units 2004-2012). A financially sustainable local government unit is able to generate sufficient revenues to fulfil its basic function of providing services at an acceptable level (Financial Management, 2014, p. 10). Therefore, the financial situation of local government units affects the development of other fields of their functioning and is a source of information about their potential for economic development, and at the same time allows comprehensive assessment of the operation of these entities.

In Polish legal regulations, there is no literal and comprehensive definition of financial stability. References to individual elements facilitating the maintainence of the financial stability of LGUs are included in the Public Finance Act:

- (Article 242) - budget balance;
- (Article 217) - rules for financing the budget deficit;
- (Article 222) - establishment of a system of reserves;
- (Article 254) - managing the financial economy of LGUs;

- (Article 86, Article 260) - actions aimed at maintaining financial stability;
- (Article 243) - individual debt ratio (IDR) - limitation of indebtedness.

The issue of financial stability in the territorial government sub-sector is much less recognized in the literature than in the entire public finance sector. It is crucial to address the notion of th financial stability of local government units, which are an important entity of the financial system due to their share in the redistribution of public money, participation in the redistribution of EU funds, and the volume of purchases of goods and services made as part of the tasks implemented.

After the political system was transformed, local governments gained financial independence, which influenced their development in the area of finance management. Financial, systemic and administrative decentralization has introduced the freedom to make financial and economic decisions. A visible disadvantage of the functioning of the public sphere financial system is financial decentralization, which is not keeping up with the decentralization of tasks. The relationship between the level of financial resources and the degree of implementation of public tasks and the quality of life of the local community is widely known. However, delegating tasks to the level of local government is not always accompanied by transfer of adequate financial resources. It should be emphasized that one of the most important requirements of stability is a well-structured financing system for LGUs.

Although there is no uniform definition in the literature on the subject, there have been attempts to determine the financial stability of local government units as a state enabling the implementation of functions assigned to LGUs, and enabling the execution of transactions related to LGU tasks, with a guarantee that they will not have a negative impact on the budget. This stability is often defined as a state of the effective allocation of financial and material resources; as well as effective risk identification and management (Filipiak, 2016, p. 14-15). Pressure on the ever-constant local development; and providing high-quality public services with simultaneous multidirectional operation of a local government unit, means that financial resources are far from sufficient (Hok, 2016, p. 112). It can therefore be concluded that, on the one hand, a source of weakness for local government finance is the shortage of financial resources; and on the other hand, the lack of a rational system of managing them in accordance with the idea of sustainable finances.

The financial stability of LGUs is often combined with the issue of financial security manifested in the ability to meet obligations (Article 44 section 3 of the Public Finance Act), as well as income efficiency and the effectiveness of tasks implementation while maintaining the ability to implement development policy (Filipiak, 2016, p. 13-33). The practice of local government bodies verifies a theoretical approach through the need to make decisions that take into account the existence of various factors destabilizing financial security. In the aforementioned context of financial security, the state of financial stability of LGUs is identified with the situation in which any distortions from the market will not cause the loss of potential, and thus the ability to meet the obligations, and the implementation of tasks will be ensured at the current quality and quantity level.

Material and methodology

The literature of the subject was reviewed and it was determined that the financial stability of LGUs can be analysed on the basis of solvency defined as the accumulation of budgetary surpluses guaranteeing debt repayment, the ability to service liabilities conditioned by the level of budget liquidity, the stability of debt, the ability to generate a surplus of the original budget, and the ability to control and manage debt-related risks. In addition, the Canadian Institute of Chartered Accountants (CICA), one of the oldest organizations stating the directions of accounting development and financial analysis, noticed the need for standardization of practices and methodologies for measuring financial stability and issued documents recommending practices of financial situation analysis. In order to establish a common financial stability framework, it proposed basing it on three dimensions: sustainability, vulnerability and flexibility (CICA 1997, 2009).

The purposeful selection of 5 voivodeships was dictated by their peripherality, both in terms of spatial dimension (defined by the distance from the development centres of Poland and the European Union), as well as in socio-economic terms. The level of economic development of these areas is one of the lowest in the European Union. A low level of innovativeness, competitiveness and investment attractiveness is also characteristic for this area. Developmental delays of the macroregion have deep historical roots and are examples of long-term processes (Kukliński, 2010). Eastern Poland is also distinguished on the national scale by the quality of the natural environment

due to the greater percentage, compared to the national average, of area covered by various forms of legal environmental protection (39.4%, while the national average is 32.5%) (Kozak, 2011, p. 90).

As a result of a diagnostic survey carried out in 2018 among local government units located on the territory of voivodeships of the Eastern Poland macroregion: Lubelskie, Podkarpackie, Podlaskie, Świętokrzyskie, and Warmińsko-Mazurskie, opinions on the factors determining the financial stability of LGUs were obtained. The answers given by the financial management staff of the local government units surveyed, i.e. the treasurers of 10 cities with poviat rights, 100 urban and rural communes and 100 rural communes, allowed for analysis in terms of elements decisive for the financial stability of the units represented. The primary data obtained in the qualitative study were analysed and are her presented graphically.

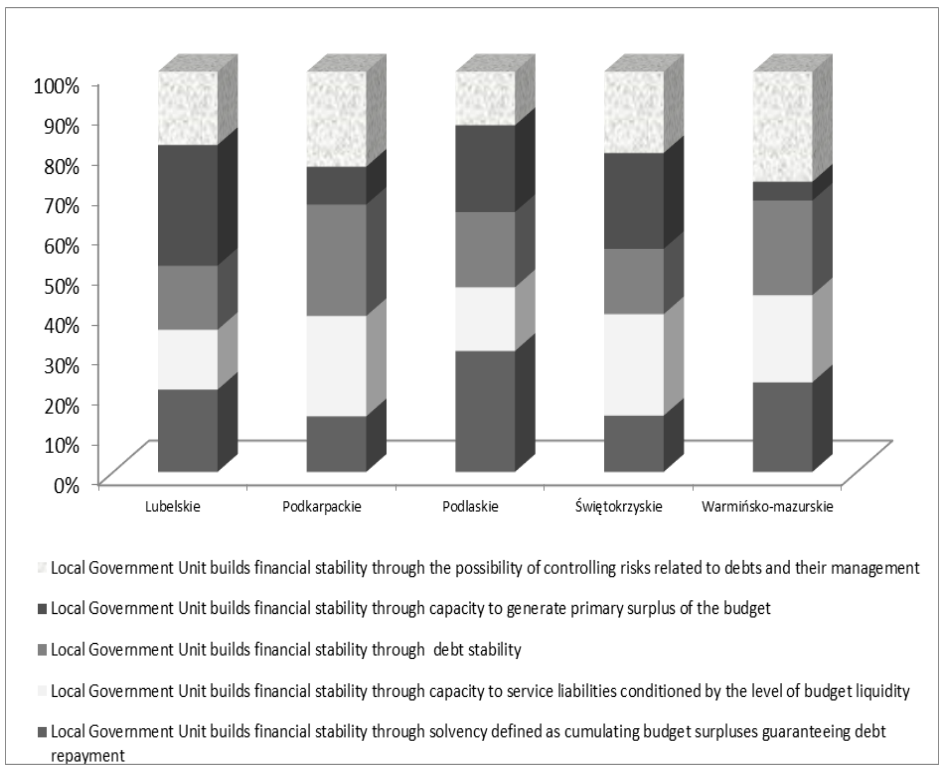
Results and discussion

In the literature, financial stability is understood as the ability to settle financial obligations while ensuring continuity in the provision of local government services. This continuity is a consequence of balancing the budget, financial independence, independence from transfers, financial liquidity and long-term solvency as well as the rational spending of public funds in communes (Stanny, Strzelczyk, 2018, p. 64). Financial stability is also characterized by a structure that strives to ensure budget balance while at the same time shaping the conditions for the increase of the degree of financial independence and security in the field of short and long-term solvency.

The study analysed the significance of solvency defined as the accumulation of budgetary surpluses guaranteeing debt repayment, ability to service liabilities conditioned by the level of budget liquidity, debt stability, ability to generate surplus of the original budget, and the ability to control and manage debt risks in building financial stability of local government units. The distribution of answers provided by the examined voivodeships is presented in Chart 1. The obtained data show that opinions on those key factors determining financial stability differ in the voivodeships examined. In the case of the Lubelskie Voivodeship, 32% of the surveyed entities considered the ability to generate surplus of the original budget to be a key factor in building financial stability. Units from the Podkarpackie Voivodeship considered debt stability as being the most important (27% of surveyed units), while in the

Podlasie Voivodship 32% of the management board members of surveyed units believe that solvency as a cumulative budget surplus guaranteeing the repayment of debt is the main factor in terms of building financial stability. The capacity to service liabilities, conditioned by the level of budget liquidity, was indicated as the main factor determining financial stability in 24% of the surveyed units from the Świętokrzyskie Voivodeship. In the Warmińsko-Mazurskie Voivodeship, 25% of treasurers mentioned the possibilities of controlling andmanaging debt-related risks as the main building block of financial stability of local government units.

Chart 1. Factors building financial stability of territorial government units by voivodeships of Eastern Poland macroregion (%)

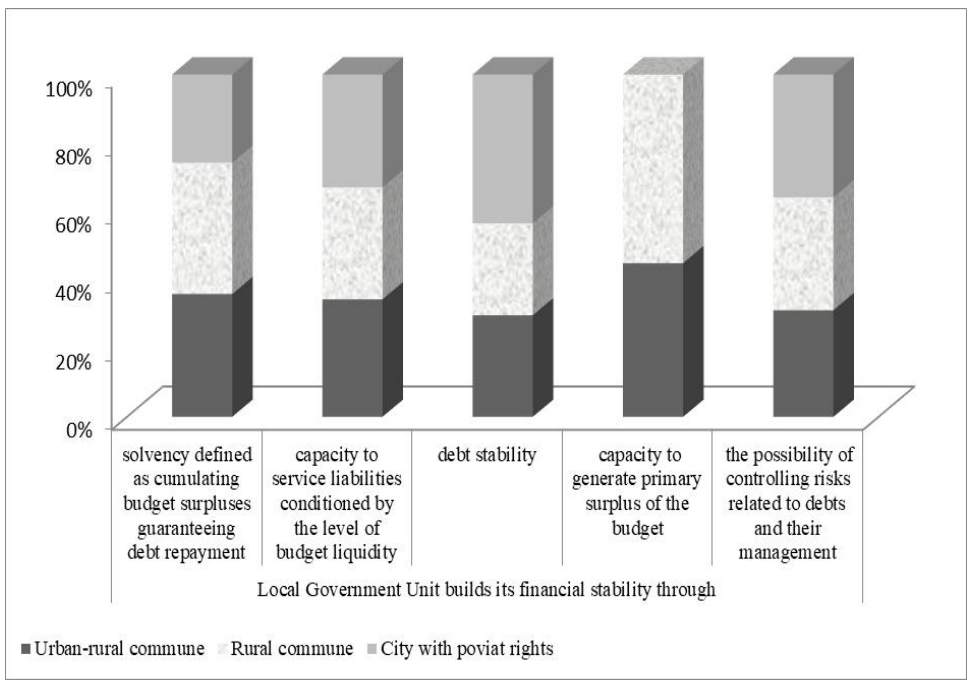


Source: own elaboration (questionnaire for the staff of finance management of the local government unit).

In the next stage of the research, the main factors determining financial stability in individual types of units were analysed (Chart 2). The distribution of the obtained answers indicates that the examined types of units as being the most important element for creating financial stability; usually

considered the same factor in the form of the ability to service liabilities conditioned by the level of budget liquidity: 35% urban and rural communes, 33% rural communes, and in the case of cities with poviat rights - 33% of respondents. Another important element was the stability of debt, which was recognized as an important factor by 33% of cities with poviat rights, 23% of urban and rural communes, and 21% of rural communes. In the case of cities with poviat rights, no unit indicated a surplus of the original budget as being a creator of financial stability of LGUs.

Chart 2. Factors building financial stability of territorial government units by the types of units of Eastern Poland macroregion (%)

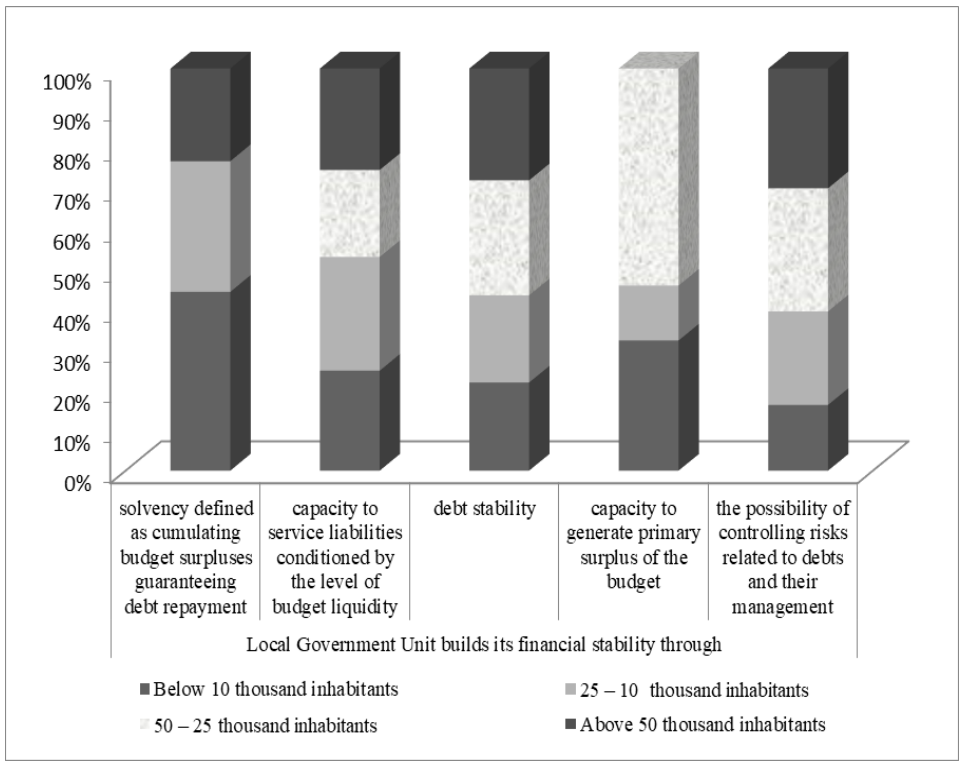


Source: own elaboration (questionnaire for the staff of finance management of the local government unit).

The answers given were also analysed depending on the number of inhabitants of selected local government units, as shown in Chart 3. In local government units, where the number of inhabitants did not exceed 10,000 residents, or ranged from 10,000 to 25,000 inhabitants, the ability to service liabilities conditioned by the level of budget liquidity was considered the most important determinant of financial stability (33% and 37% of the respondents respectively). In the case of units with more than 25,000 inhabitants, it can be

noted that equal factors were recognized as crucial, i.e. the ability to service liabilities conditioned by the level of budget liquidity, stability of debt and controllability of debt-related risks and risk management (29% in case of LGUs inhabited by 25,000-50,000 residents and 33%, 28% and 28% in the case of LGUs inhabited by more than 50,000 residents).

Chart 3. Factors building financial stability of territorial government entities by the number of inhabitants of Eastern Poland macroregion (%)



Source: own elaboration (questionnaire for the staff of finance management of the local government unit).

Conclusions

Sustainable public finance and the problem of stability of public sector units is extremely important due to the role they play in the financial system. Financial stability at the level of local government units is still a current issue, which results from the need to move from the financial administration of these units towards the real management of their finances.

The obtained and analysed views on the financial stability of local governments evoke some reflections. It should be emphasized that at the level of voivodeships of the macroregion of Eastern Poland there are very diverse opinions regarding the main factor building the financial stability of LGUs. In turn, the analysis of responses provided by the representatives of the types of local government units under review indicates that similar views regarding the key factor creating stability were recorded in all types tested. The capability to service liabilities conditioned by the level of budget liquidity and debt stability was considered to be the most important factor.

Another element that classified the analysis of the opinions was the number of inhabitants. In this respect, a certain division into units with a small population of up to 25,000 has been noted, in the case of which one of the components of financial stability is important, i.e. the capability to service liabilities, conditioned by the level of budget liquidity. In the second group of units where the population exceeded 25,000, the multifaceted nature of the problem of building financial stability was observed, and therefore the distribution of responses indicated the recognition of three equally important variables determining the studied phenomenon.

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■ PART 1 ■

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