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Piotr Adamczewski

WSB University in Poznań
Institute of Management
e-mail: adamczewski@wsb.poznan.pl
tel. 61 655 33 24

Knowledge Management in Intelligent Organizations in Times of the Digital Transformation: Findings of a Study of the Polish SME Sector

***Abstract.** Small and medium enterprises play an essential role in the global economic growth. The share of the Polish SME sector in GNP has been at the level of 48% for years now. This sector has also been among the most dynamically developing and computerised areas in the Polish economy. Effective knowledge management can be analysed in different areas: organizational structures, personnel, organizational culture, and ICT tools. ICT (Information and Communication Technology) systems constitute the foundation of modern economic organizations in times of digital transformation. This applies particularly to advanced ICT infrastructure, which is the condition sine qua non for effective knowledge management. The objective of this article is to discuss organizational and technological aspects of modern ICT-based knowledge management called SMAC (Social, Mobility, Analytics, Cloud), regarded as the present canon of ICT support in this respect. The analysis is supported with findings of a study carried out by the author in 2014-17 in selected SMEs from Mazowieckie and Wielkopolskie provinces.*

***Keywords:** ICT, SME, intelligent organization, SMAC, knowledge management*

Introduction

The operation of globalised and modern organizations requires the continuous adaptation of management methods and development strategies to new economic conditions. This is particularly important in the process of digital transformation, which has been transforming all sectors for several years now. This



applies in particular to the issues of knowledge management in economic organizations, which can be analysed in the area of organizational structures, business processes, personnel, organizational structure as well as ICT that supports management.

Similarly to other EU Member States, the largest share of GNP in Poland is generated by the sector of small and medium enterprises. The competitive potential of SMEs operating in Poland is high (very high price competitiveness, high competitiveness in terms of product and service quality, and improving innovation competitiveness). However, to fully utilise such potential, SMEs have to operate based on state-of-the-art ICT solutions. Due to differences between SMEs and large organizations and international corporations, a question arises as to the extent to which the SME sector can implement advanced ICT solutions effectively in the period of digital transformation? What factors determine decisions taken in this respect, and what implementation barriers occur?

This article is aimed at presenting the latest condition of digitalization and development tendencies in supporting the SME sector with SMAC solutions (Social, Mobility, Analytics, and Cloud), which is a *sine qua non* condition of enterprises from this sector to operate in a modern way and to take part in the process of digital transformation. According to research by Cisco Global Cloud Index, half of the global population will have access to the Internet in 2018, and more than 53% of them will use tools for storing data in the cloud [Cisco 2016: 77]. ICT implementation in every organization depends on numerous factors, mostly organizational, human, and technical, but also on the needs of the management, which can be more or less conscious. Unlike large organizations, where the implementation of advanced SMAC is perceived positively, it seems that an opposite approach can occur to this trend in the SME sector. Hence, the objective of the research has been defined to test the readiness of Polish SMEs to implement and use systems within the so-called 3rd ICT platform.

In order to fulfil the objective, the following research hypotheses have been formulated:

- elements of SMAC solutions are used on an increasing scale in SMEs,
- SME management pay growing attention to the implementation of SMAC systems.

The analyses are illustrated with survey results and direct observations of the author from 2014-2017 in selected 120 SMEs from Mazowieckie and Wielkopolskie provinces, Poland, with reference to the general development trends in the studied area. The survey sample was made up of micro (9%), small (56%) and medium sized enterprises (35%). Surveyed companies represent a wide range of industries: retail and wholesale trade, discrete and process manufacturing, transport, HoReCa, utilities, finance, construction, telecommunication and IT.

1. Modern organizations in the turbulent economic environment

The dynamics of market changes and the high level of turbulence in business environment make modern economic organizations face the challenge of continuous improvement in their operational methods and development. In practice, it implies the necessity to use modern ICT solutions in knowledge management, which enable to support business processes within the acquisition and reinforcement of business's competitive advantages. Within the evolution of the information society towards the knowledge society, it boils down to the treatment of modern organizations as intelligent organizations. A intelligent organization is one whose business philosophy is based on knowledge management [Waltz 2003: 45]. This term became popular in the 1990s owing to the growing ICT development, the dynamically changing economic environment, and the increasing market competitiveness. An intelligent organization is one that learns and has the capacity to create, acquire, organise, and share knowledge and use it in order to raise the efficiency of its operation and increase competitiveness on the global market. The idea of such an organization is based on the systemic approach to organization, i.e. its treatment as a complex organism founded on existing structures and executed processes, focusing on the role of knowledge. In that approach, which is called 'the fifth discipline' by Peter Senge, owing to knowledge and suitable tools all elements of an organization and its personnel can collaborate in order to achieve set objectives [Senge 2002: 77]. Thanks to that, the whole organization operates as an intelligent and successful organism in the competitive environment. This explains the mutual relationships between methods of fulfilling targets, their understanding, methods of solving problems as well as internal and external communication.

The most important characteristics of a intelligent organization include, among other [Grösser 2012: 145; Schwaninger 2010: 45]:

- fast and flexible operation,
- the ability to monitor the environment,
- the capacity to diagnose early market signals and to react to changes in the environment,
- the ability to implement new knowledge-based solutions and achieve economic benefits therefrom.

The growing volume of information used in a intelligent organization is accompanied by its increasing importance. Peter Drucker indicated already that traditional factors of production, such as growth, labour, and capital, are losing their importance in favour of a key resource, namely knowledge applied in the creative operation of an organization. It constitutes intangible resources that are

related to human actions, whose use may be the basis for gaining a competitive advantage [Schwaninger 2010: 123]. Knowledge has to be treated as information embedded in the context of an organization and a skill to use it effectively in the organizational activity. It means that knowledge resources are data about its customers, products, processes, environment, etc. in a formalised form (documents, databases) and in non-codified forms (knowledge of staff).

In the practical dimension, the effective collaboration of such elements means the necessity to use advanced ICT solutions. Technical, technological, and organizational innovations, which have appeared in recent years, are all utilised. They encompass almost all areas of a modern organization operation, starting from means of transport and equipment, through organization and material and raw material flow management, to the development of system structures that implement business processes, i.e. within logistics systems that are the essence of modern management based on e-logistics [Adamczewski 2016b: 7].

2. Knowledge management in theory

The dynamic ICT evolution and the growth of competitive requirements in the global economy have made knowledge a key factor in the operation and development of modern organizations. It constitutes intangible assets of a business related to human actions. The use of such assets may be the foundation for a competitive advantage. Out of a large number of used terms, for this analysis it has been assumed that knowledge is a structurally organised set of information that includes the rules of its interpretation, while information is data used in a specific organizational context [Jemielniak 2012: 39; Unold 2015: 98]. In literature knowledge is analysed also with reference to management. The following examples of knowledge definition can be quoted:

- informal information resources of an organization related to human actions; when applied, they can be the basis for a competitive advantage [Kisielnicki 2008: 28],
- a set of information organised in a structure together with the rules of its interpretation [Jemielniak 2008: 24], and
- intangible assets that affect the efficiency of operations in every organization [Stabryła 2009: 167].

In literature, knowledge management (KM) is defined in many ways. It results mostly from the growing interest in an executive process rationale, which occurred in particular in the 1980s and 1990s. Knowledge management is defined in many aspects as a process that can be used to gain and utilise specific data resources and information. As a result, an organization is capable of maximising its benefits and reach its own strategic targets [Stabryła 2009: 168].

In Polish literature, the task of defining knowledge management has been undertaken, among others, by Kazimierz Perechuda. He emphasized that the term is to be referred first of all to a process that involves the continuous implementation of a management function with any and all resources available in an organization, i.e. both those that are internal and external and those that are hidden or explicit, as well as all the tasks and instruments related to the performance of tasks within the processes of organization and communication. In his opinion, knowledge management is the type of management that operates within knowledge economy [Perechuda 2005: 7].

On the other hand, Mariusz Strojny noted that knowledge management involves primarily the creation, distribution, and proper use of knowledge, where the most important in this respect are:

- technology used to support the implementation of processes related to taking executive decisions in organizations; such technology may have the form, for example, of systems, such as internet, extra- or intranet,
- organizational culture, where people are in the centre; such a culture contributes to sharing knowledge and the development of shared interests among the personnel in an organization, and
- systems, methods, and tools that may be used to measure the efficiency of knowledge use effectively [Strojny 2000: 7].

A larger number of elements that form knowledge management was listed by Ashok Jashapara. In his opinion, knowledge management, in addition to technology and organizational culture, includes an organizational strategy as well, including in its aspect that concerns intellectual capital and organizational efficiency, i.e. so-called 'soft' factors [Jashapara 2006: 47].

In the opinion of Bogusz Mikoła, knowledge management can be analysed within four different meanings:

- functional – from this perspective knowledge management involves the performance of periodical and continuous management functions, which are focused on knowledge resources and processes that take place with the use of knowledge,
- process – knowledge management includes procedures that are of standardising and commanding nature; owing to them, organizations can establish a suitable environment for the effective implementation of strategies based on knowledge management, which enable the development, sharing, and effective use of knowledge,
- instrumental – knowledge management encompasses a suitable selection and use of instruments, such as economic, organizational, technical, and legal tools, in particular incentive and information systems, in order to implement main processes with the use of knowledge,

– institutional – in this aspect, knowledge management concerns the system of positions and personnel teams, which are involved in the fulfilment of tasks related to knowledge management in an organization [Mikuła 2011: 18].

According to the above-mentioned definitions and interpretations, knowledge management is defined in many different ways. A large number of perspectives, where focus is on varied aspects, indicates that it may affect the operation of specific organizations in their numerous aspects and is subject to dynamic transformations. Such transformations result, *inter alia*, from the fast technological progress and the intensive search for the increasingly effective methods of gaining a competitive advantage on the market and acquiring new customers by organizations.

Knowledge management will be understood hereunder as the process of identifying, acquiring, collecting, processing, sharing, and using knowledge, aimed at improving a competitive position of an organization. Knowledge management is supported by four aspects: leadership, organizational culture, technology, and a measuring system [Waltz 2003: 59].

Information and its effective management have become one of the essential development factors of modern organizations in the information society. The basic role is played there by advanced ICT solutions. Its foundation are the concepts of the so-called third wave offered by A. Toffler. The dynamic growth of ICT and management pragmatics have made the time paradigm equally promising as cost paradigm in the economic activity of the information society era. The practical shortening of a time path in the cyberspace and disregarding geographic boundaries have resulted in the major acceleration of business processes in the global chain of supplies.

The concepts of knowledge management appeared in the early 1990s and gained significance with the ICT revolution. At the beginning of the 21st century, they underwent a fast metamorphosis. At present, they are divided into numerous schools and currents.

Classic approaches to knowledge management encompass:

– a technocratic approach – it focuses on systems of processing information, distribution, reproduction, and knowledge resource protection, etc.,

– a behavioural approach – its focus is on changing the operating philosophy in an organization and on organizational behaviours: strategies, practices, and creating social networks (both external and internal); it speaks about ‘intelligent organizations’ and ‘learning organizations’,

– an economic approach – focused on the conversion of knowledge into funds and *vice versa* [Schwaninger 2010: 85].

The present status in this respect can be put simply as certain eclecticism in the understanding of the whole mosaic of numerous approaches (mostly technocratic and behavioural). It is difficult to indicate a ‘pure’ project that would imple-

ment the assumptions of only one approach. As a result, it is difficult to compare projects and assess the efficiency of individual solutions. A technocratic approach was often promoted by ICT companies, while the behavioural approach was usually supported by consulting firms. The economic approach was created by consulting firms as well, but there is no certain data on its results. In general, there are no scientifically justified recommendations for specific solutions.

Knowledge management is a developing discipline with varied characteristics. The IT revolution is overturning the existing world of business and it continues, while its pace is still increasing. Organizations are facing new challenges; however, the present status of research does not allow to give explicit recommendations as to solving their problems; therefore, most investments in knowledge management are in fact experimental. In Poland, we are standing on a threshold of the epoch that will see fast changes in this respect.

3. Digital transformation environment

The present effect of the ICT evolution in the form of the so-called third ICT platform, has been treated since 2013 as the foundation of the 4th industrial revolution, being the natural development stage of the 3rd revolution of 1969 (its symbol being electronics with its transistor and automated production). The main distinguishing element of new changes has become the redefinition of the present course of business processes that contributes to new operating models of economic organizations facing new challenges to maintain their position and expand on the market further. The industrial revolution of the 4th stage is breaking out due to [Report 2016: 125]:

- the introduction of the all-present digitalization,
- decision processes based on virtual simulations and data processing in real time, and
- machine-machine and machine-man communication.

The digital transformation means a change of the present approach to a customer and a comprehensive process where an organization moves to new methods of operation using the state-of-the-art SMAC digital technology, including social media, mobility, big-data – analytics, and cloud computing. However, it has to be kept in mind that the role of digital technologies in that process is to enable the necessary changes and open an organization to new opportunities. Therefore, they should be a tool rather than the aim of transformation. The centre of the process has to be the customer and his needs, as the main driver for manufacturers and service providers. The digital transformation is no longer the method of gaining a competitive advantage – it is becoming a factor that enables to stay on the market.

Today, it is difficult to find an economic sector that would be isolated from what is happening in the area of ICT solutions. Within several years, Airbnb, a company with no hotels at all, and in fact operating based on an algorithm of room rental, has become one of the main players on the global hotel market. A similar role is being played by Uber on the taxi service market. Both organizations have made innovations of a digital disruption type, which have changed the previous business order, providing customers with new advantages. In most cases, technological innovations and solutions that change business models and operating conditions in individual enterprises and whole sectors come from outside. Therefore, the careful monitoring of what is happening in ICT is the requirement not only for ICT companies, banks or telecommunication firms, but primarily for all organizations that want to maintain their leading position on the market.

Elements of the digital transformation include:

- SMAC technologies,
- IoT – Internet of Things,
- multi-channel models of product and service distribution,
- automation and robotisation [Li 2015: 670; Perera 2015: 58].

Such technologies determine changes in three areas of intelligent organizations that apply them through:

- developing relations with customers and counterparties owing to the deeper understanding of their needs, introducing numerous channels of communication, and enriching forms of self-service,
- improving operational processes within internal organizations and working environment as well as mechanisms of monitoring their efficiency,
- modelling organizational operations within product manufacturing and services provided on the market.

Almost one third of management boards in leading global organizations expect that their revenues in the following years will be threatened by so-called digital disruptions, i.e. phenomena of a sudden appearance of new technologies and business models that will affect the value of products and services provided by such organizations [Report 2016: 89]. It can be concluded that the world of business has become even more changeable, and primarily unforeseeable and complex. The concept of VUCA is often used to describe such phenomena [Marz 2015: 122], namely:

- Volatility – in particular the dynamics of changes and their catalysts, which are not governed by any predictable patterns,
- Uncertainty – no predictability that certain events will take place and the low awareness and understanding of situations that occur,
- Complexity – complexity and correlation with the lack of systematic knowledge that would allow to plan actions in a reliable manner,

– **Ambiguity** – ambiguity and the lack of explicit interpretation of phenomena with the risk of interpreting conditions and cause-and-effect relationships.

It means that in conditions of extreme competitiveness and the digital transformation, the previous methods of management are failing, as they have often been focused exclusively on providing stability and predictability. Advance ICT solutions for knowledge management provide assistance in this respect.

4. ICT ecosystem in a modern organization

Literature regarding this discipline presents two models of adapting ICT solutions in organizations [Duczowska 2013: 44]:

- a ‘linear’ model (‘a ladder’),
- a relationship and conditional model (‘a transporter’).

A linear model provides for the gradual implementation of ICT in stages by business organizations. The sequence complies with e-business generations, where the following stages are listed [Adamczewski 2016a: 201]:

- access to the Internet (e-mail and a browser),
- a company website,
- e-commerce – procurement and sale over the Internet,
- e-business – e-commerce with IT systems that optimise enterprise operations,
- networking with other enterprises (electronic enterprise ecosystems).

The conditional model starts with the assumption that the implementation of ICT in an organization does not take place linearly but depends on the following two most important factors:

- forecast organization development,
- expected utility of Internet technologies.

The basic premise of the second model means that the e-business implementation does not have to be linear. Specific solutions can be applied without a sequential order after approval of the management of the organization. The management decides to modify its structure, taking account expected benefits, the readiness and possibility of making changes in the enterprise, and external factors, such as pressure from customers or counterparties.

An intelligent organization, as an economic system that uses advanced ICT infrastructure in its internal organization and communication, including external communication, constitutes the essence of information society operation in business areas at present. In practice, it means that IT supports basic organizational structures and the application of the now economy concept in the on-line mode with [Adamczewski 2016b: 9]:

- the level of technical infrastructure (hardware),

- the level of system-communication infrastructure,
- the level of application software,
- the level of integrating business processes with external counterparties.

The dynamic development of ICT has led to the development of a new technological standard, namely SMAC systems, which enable to introduce new business models. They are based on four pillars:

1. Social – social networks are breaking barriers in information flow among people and are becoming platforms where the fast exchange of knowledge is becoming increasingly effective. Communication within social platforms is strongly replacing telephone or e-mail communication. This phenomenon is taking place in businesses as well, where the fast information exchange is of great importance. The use of social networks makes it possible to obtain a better customer interaction and, as a consequence, it becomes possible to react faster to problems and build a knowledge base according to preferences and behaviour of users.

2. Mobile – mobile devices, such as smartphones, tablets, and notebooks, have become a basic working tool of a modern worker. They have also enhanced the opportunities to reach customers who use mobile phones and have become accustomed to e-shopping and using different types of services and applications any-time and anywhere. The growing popularity of mobile shopping has also forced enterprises to develop their online marketing and to provide customers with mobile channels. In such conditions, the presentation of an offer on mobile devices is the first step in achieving and maintaining a high position on the market.

3. Analytics – understanding the behaviour and preferences of customers is one of the greatest advantages of using analytics. By using collected data that is analysed with advanced algorithms, entrepreneurs can deduce how to earn loyalty from their customers, improve marketing campaigns, enhance product development processes, and render services that meet the preferences and requirements of customers. By learning tastes of their users, entrepreneurs can present content according to their expectations. The ultimate aim in using analytics in business is, therefore, taking right decisions based on updated and segregated information.

4. Cloud – the technology of a computing cloud offers tools that enable to collect and process data on network services effectively, which contributes to the efficient organization management. By using tools available in a cloud, it is possible to reduce operating costs of ICT systems, break down geographic barriers, and obtain access to data at any time and place. A cloud is a factor that puts other elements of the SMAC solution together.

There are numerous examples in the business practice proving that expectations and actual benefits from using ICT solutions do not tally. The cause of such an effect may be the shortage of the sufficient integration between implemented systems. A key to success in using the SMAC technology is to combine the four

above-mentioned technologies, which communicate among themselves, and to enable a synergy effect. None of the four technologies alone can give a full effect. Only synergy generated by all SMAC elements working together makes it possible to create a competitive advantage. So far, organizations have invested in mobility, cloud, business analytics, and using social media in business by creating independent, usually unintegrated solutions. Their combination within the third ICT platform allows to create new revenue-generating services, deepen relationships with customers, and improve the efficiency of organizational operation [Adamczewski 2016a: 205].

By developing a computing cloud and mobility, it has been possible to move from closed communication systems to social platforms [Barry 2015: 45; Mateos 2011: 58]. As a consequence, the working system and business communication have changed deeply and permanently. Social channels have made it possible to create and provide access to content, the broader distribution of information, as well as the better cooperation and interaction with customers. Mobile technologies have provided easy access to information through the non-stop Internet connection. Data analyses are used to optimise the management of customer relationships and improve the efficiency of sales channels. Finally, a cloud is in many enterprises a foundation of their ICT systems, improving their flexibility and scalability, while reducing costs of data processing at the same time.

Organizations that want to maintain their position on a competitive market have to be ready to provide their customers with services that are fully customised. Owing to the SMAC development, IT is no longer only the support in business development, but rather a turning point that gives an advantage to organizations and enables them to stand out against their competitors. SMAC provides required information on time, which makes it possible to take good decisions and to collaborate effectively both inside and outside an organization, i.e. in the whole cooperation chain.

The unique ICT ecosystem of an intelligent organization is usually based on advanced ERP solutions (*Enterprise Resource Planning*). ERP systems in their traditional function as solutions that integrate an information infrastructure in an organization are no longer sufficient. Their basic functionality has been enriched with Customer Relationship Management (CRM), Supplier Relationship Management (SRM), Supply Chain Management (SCM), and Product Lifecycle Management (PLM). Owing to their properties, SMAC systems enable to raise the efficiency of information services in business processes and, finally, to achieve higher market competitiveness. A conclusion can be ventured that such solutions are no longer a way of gaining a competitive advantage for organizations, but have become a factor that determines their survival on the global market [Adamczewski 2016a: 205].

According to IDC forecasts, in the next two years 80% of global organizations will initiate projects of digital transformation in their knowledge management, to be based on SMAC systems, including as many as 50% of outlays spent on the 3rd ICT platform solutions [Report 2016: 37].

Research carried out by the author¹ shows that the popularity of IT support in management processes in SMEs can be presented as follows (percentage of analysed enterprises):

- finance and accounting – 87%,
- human resources – 75%,
- warehouse management – 63%
- production management – 21%,
- customer relationship management – 52%,
- office work support – 96% (including e-mail 98%),
- procurement and sale process service – 64%.

The analysed enterprises use laptops and PCs in their day-to-day operations (99% of indications). On average, they hold about 15 computers. The vast majority use both land lines and smartphones. Tablets are used in every third enterprise (36%), with 4 tablets per firm on average. The above-mentioned statistics are supplemented with the 48% ratio of using online messenger systems and taking advantage of the support provided by ICT freelancers at 59%. SMEs usually do not use multi-layer data processing protections. Instead, they choose only basic anti-virus software (90%). Every second enterprise (53%) protects its data with a standardised policy of passwords that are set and managed by the management. On the other hand, less than half SMEs (48%) encode their e-mails. Only one out of three firms uses data backup (35%), including as many as 88% having that process automated. Interestingly, backup is used to secure company data more often by entities that do not consider their ICT security to be of essential importance for their business.

The readiness of the studied entities to face the challenges of digital transformation is as follows:

- 22% of respondents answered positively, confirming the implementation of such tasks,
- 12% of respondents answered that such actions would be taken soon,
- 20% of responses indicated that such actions would be taken in the near future, and
- according to 46% of respondents such actions were not being conducted and there were no such plans.

¹ The research was conducted in 2014-2017 on a selected sample of 120 enterprises from the SME sector in Mazowieckie and Wielkopolskie provinces.

As regards the use of SMAC solutions, the statistics of the analysed entities reflect the general global trend in this respect, i.e. [Choi 2016: 267; Gajewski 2016: 55; Report 2016: 39]:

- a cloud is used in 18% organizations (38% of analysed population plans to start using it),
- mobility is utilised in 29% of organizations (with 15% of analysed population planning to launch it),
- analytics is applied by 9% of organizations (while 16% of studied population have plans to start it),
- social media are declared by as many as 45% of organizations already, and their use in the near future is declared by 55% of respondents.

The development trends of Polish intelligent organizations in the digital transformation is supplemented with the following declared initiatives [Corcoran 2016: 75; Gajewski 2016: 77]:

- office digitalization – 70%,
- modernization of ICT infrastructure – 64%,
- consolidation in ICT and advanced analytics – 49%,
- new mobile applications for personnel – 49%,
- networking – 49%,
- mobile self-service applications for customers – 30%.

The fact of placing a customer in the centre was confirmed by responses about catching up with the dynamically evolving needs of contemporary consumers. Moreover, half of the respondents indicated the necessity to follow the changing expectations of their customers, declaring it to be their top business priority. The continuous improvement of customer satisfaction level is possible mostly owing to investments in new ICT solutions. Only owing to them shopping can be comfortable, fast, and possible at any time and place, while customer service can be effective. It also means the new opportunities in acquiring knowledge about needs, behaviour, and opinions of customers.

In general, the above-mentioned study results show that Polish modern business organizations are becoming more confident in using advanced solutions of SMAC systems, to meet the challenges of digital transformation.

The growing demands of intelligent organizations within the ICT support for knowledge management result in general from their operation in real-time (RTE – *Real Time Enterprise*). Therefore, SMAC systems enable to raise the efficiency of management to a higher level by:

- reaching customers more effectively with mobile solutions,
- understanding customer needs better by using advanced analytics,
- communicating with customers more effectively via social media,
- reducing data processing costs with cloud computing solutions.

Conclusion

The dynamic economic changes and the evolution of business relationships devalue traditional sources of competitive advantages in the SME sector, such as capital, infrastructure, access to outlets, and the quality of offered products and services. Modern enterprises that want to compete on the market effectively have to give priority to flexibility of their organization and its ability to implement innovative business models and reorganise logistics processes. Examples of numerous Polish SMEs show that the vision of a business managed in a modern way has come into the dynamic phase of realization, while the effective knowledge management with advanced ICT solutions is growing to the role of paradigm. There is no doubt that reserves still present in the SME sector can be utilised, through supporting its operation with advanced ICT systems with the dominant role of SMAC solutions.

Conducted research has confirmed research hypotheses. It shows that SMAC solutions are more and more common among small and medium enterprises while company management of the surveyed enterprises pays more and more attention to applying knowledge management systems. This stems from the conviction that in the times of digital transformation information technologies which support effective knowledge management not only allow to keep up with the rising competition but are an indispensable condition of market survival.

Nevertheless, it has to be remembered that the creation and development of such smart technologies has one basic aim for businesses, namely to accelerate the development pace and improve the quality of offered products and services, while reducing operating costs. Although it seems apparently simple, paradoxically innovation of Polish business organizations from the SME sector is burdened with the concern about the unknown. SMEs are afraid of investing in solutions that are not popular yet. Nevertheless, the strategic vision of the management in such organizations will determine the directions and pace of popularising modern and effective solutions in knowledge management, which may contribute to the improvement of their competitiveness on the global market.

According to the above analysis, the conditions of effective knowledge management in intelligent organizations have to be treated in a complementary way, so that ICT aspects, although very important, do not dominate the preparatory work or the operation of solutions in this respect. Equally important are so-called 'soft' conditions, which concern the strategy of organization's development, its organizational culture, and qualifications and motivation of personnel. One thing seems certain already — the period of digital transformation poses new challenges for Polish intelligent organizations in the area of knowledge management. If they rise to them, they can compete on global markets more effectively.

References

- Adamczewski, P., 2016a, ICT Solutions in Intelligent Organizations as Challenges in a Knowledge Economy, *Management*, 20(2), 197-208.
- Adamczewski P., 2016b, The Holistic Approach of E-logistics in Intelligent Organizations, *Zeszyty Naukowe Uniwersytetu Ekonomicznego w Katowicach*, 281, 7-18.
- Barry D.K., 2013, *Web Services. Service-Oriented Architectures and Cloud Computing*, New York: Morgan Kaufmann Publishers.
- Brunswick S., Vanhaverbeke W., 2015, Open Innovation in Small and Medium-sized Enterprises (SME's): External Knowledge Sourcing Strategies and Internal Organizational Facilities, *Journal of Small Business Management*, 54(4), 1264-1288.
- Choi T.M., Chan H.K., Yue X., 2016, Recent development in big data analytics for business operations and risk management, *IEEE Transactions on Cybernetics*, 47, 81-92.
- Cisco Global Cloud Index 2013-2018, 2016, San Jose: Cisco Systems Inc.
- Corcoran P., Datta S.K., 2016, Mobile-edge computing and the Internet of Things for consumers: Extending cloud computing and services to the edge of the network, *IEEE Consumer Electronic Magazine*, 5(4), 73-74.
- Duczowska-Piasecka M. (red.), 2013, *Model biznesu. Nowe myślenie strategiczne*, Warszawa: Difin.
- Gajewski J., Paprocki W., Pieriegud J. (red.), 2016, *Cyfryzacja gospodarki i społeczeństwa – szanse i wyzwania dla sektorów infrastrukturalnych*, Gdańsk: Instytut Badań nad Gospodarką Rynkową.
- Grösser S.N., Zeier R., 2012, *Systematic Management for Intelligent Organizations*, Berlin – Heidelberg: Springer-Verlag.
- Jashapara A., 2006, *Zarządzanie wiedzą. Zintegrowane podejście*, Warszawa: PWE.
- Jemielniak D., 2008, *Zarządzanie wiedzą. Podstawowe pojęcia*, in *Zarządzanie wiedzą*, eds. D. Jemielniak, A.K. Koźmiński, Warszawa: Wolters Kluwer Polska.
- Kisielnicki J., 2008, *MIS. Systemy informatyczne zarządzania*, Warszawa: Placet.
- Li J., Tao F., Cheng Y., Zhao L., 2015, Big data in product lifecycle management, *The International Journal of Advanced Manufacturing Technology*, 81(1), 667-684.
- Marz N., Warren J., 2015, *Big Data*, New York: Manning Publications.
- Mateos A., Rosenberg J., 2011, *Chmura obliczeniowa. Rozwiązania dla biznesu*, Gliwice: Helion.
- Mikuła B., 2011, Istota zarządzania wiedzą w organizacji, w: *Komunikacja w procesach zarządzania wiedzą*, ed. A. Potocki, Kraków: Fundacja Uniwersytetu Ekonomicznego w Krakowie.
- Perechuda K. (ed.), 2005, *Zarządzanie wiedzą w przedsiębiorstwie*, Warszawa: WN PWN.
- Perera Ch., Ranjan R., Wang L., Khan S., Zomaya A., 2015, Privacy of Big Data in the Internet of Things Era, *IEEE IT Professional Magazine*, PrePrint (Internet of Anything).
- Report IDC FutureScape “Worldwide IT Industry 2016 Predictions: Leading Digital Transformation to Scale”, 2016, New York.
- Schwabinger M., 2010, *Intelligent Organizations. Powerful Models for Systematic Management*, Berlin – Heidelberg: Springer-Verlag.
- Senge P., 2002, *Pięta dyscyplina. Teoria i praktyka organizacji uczących się*, Kraków: Oficyna Ekonomiczna.
- Stabryła A., (red.), 2009, *Doskonalenie struktur organizacyjnych przedsiębiorstw w gospodarce opartej na wiedzy*, Warszawa: C.H. Beck.
- Strojny M., 2000, Teoria i praktyka zarządzania wiedzą, *Ekonomika i Organizacja Przedsiębiorstwa*, 10, 6-8.
- Unold J., 2015, *Zarządzanie informacją w cyberprzestrzeni*, Warszawa: WN PWN.
- Waltz E., 2003, *Knowledge Management in the Intelligence Enterprise*, Boston: Artech House.

Zarządzanie wiedzą w organizacjach inteligentnych w czasach transformacji cyfrowej – wyniki badań polskiego sektora MSP

Streszczenie. Małe i średnie przedsiębiorstwa odgrywają kluczową rolę w budowaniu światowego wzrostu gospodarczego. Udział polskiego sektora MSP w wytwarzanym PKB od lat utrzymuje się na poziomie 48%. Od wielu też lat sektor ten należy do najbardziej dynamicznie rozwijającego się i informatyzującego obszaru polskiej gospodarki. Efektywne zarządzanie wiedzą można rozpatrywać w różnych obszarach: struktur organizacyjnych, zatrudnionego personelu, kultury organizacyjnej i narzędzi informatycznych. Systemy ICT (Information and Communication Technology) stanowią podstawę nowoczesnych organizacji gospodarczych czasów transformacji cyfrowej. Dotyczy to w szczególności zaawansowanej infrastruktury teleinformatycznej, która jest warunkiem sine qua non sprawnego zarządzania wiedzą. Celem artykułu jest omówienie aspektów organizacyjno-technologicznych w zakresie nowoczesnego zarządzania wiedzą z wykorzystaniem technologii ICT określanych mianem SMAC (Social, Mobility, Analytics, Cloud), a stanowiących aktualnie kanon informatycznego wspomaganie w tym zakresie. Rozważania zostały zilustrowane wynikami autorskich badań z okresu 2014-2017 na gruncie wybranych przedsiębiorstw sektora MSP województw mazowieckiego i wielkopolskiego.

Słowa kluczowe: ICT, MSP, organizacja inteligentna, SMAC, zarządzanie wiedzą