




# Managers' decisions and strategic actions of enterprises in Poland in the face of digital transformation

BOGUSŁAWA ZIÓLKOWSKA

Czestochowa University of Technology, Faculty of Management, Department of Marketing,  
ul. Armii Krajowej 19B, 42-200 Czestochowa, Poland

✉ boguslawa.ziolkowska@wz.pcz.pl

 orcid.org/0000-0002-0377-3071

## Abstract

**Motivation:** Digitalisation as a continuous process of convergence of the real and virtual worlds is becoming the main driving force for innovations and changes in most sectors of the economy. What is especially important is that current changes are radical, and in some cases even disruptive, bringing completely different values to market players and consumers. In order to cope with these changes, individual enterprises and whole sectors, public administration, society and national economies need to undertake digital transformation.

**Aim:** The aim of the article is to indicate areas of activity in which information technologies are most often implemented in enterprises in Poland as well as managers' strategic approach to this problem in the face of digital transformation.

**Results:** In order to assess the degree of enterprises' engagement in the process of implementing modern information technologies, a survey was conducted. The survey questionnaire consisted of a dozen questions concerning the perception of the issue of digital transformation and its inclusion into key strategic and organisational documents, enterprises' readiness to implement modern technologies, organisational culture, ICT use and achieved effectiveness. Digitalisation of the economy and society is one of the most dynamic changes of our times, opening up new opportunities to create business models, while bringing uncertainty and various threats connected, among other things, with social consequences of the automation of production processes and security in a broad sense.

The paper presents the level of Polish enterprises' engagement in the process of digital transformation and shows how the progress in terms of implementation of modern ICT.



*Keywords: management; enterprise; digitalization; transformation; virtualisation*  
*JEL: M15; M21; O32*

## 1. Introduction

Digitalisation as a continuous process of convergence of the real and virtual worlds is becoming the main driving force for innovations and changes in most sectors of the economy. What is especially important is that current changes are radical, and in some cases even disruptive, bringing completely different values to market players and consumers. In order to cope with these changes, individual enterprises and whole sectors, public administration, society and national economies need to undertake digital transformation.

The aim of the article is to indicate areas of activity in which information technologies are most often implemented in enterprises in Poland as well as managers' strategic approach to this problem in the face of digital transformation.

## 2. Literature review

Digitalisation is not only about individual digital technologies, but rather about the philosophy of a company's operation. Digital technologies are merely a tool that enables implementation of a digital business strategy. Digital Business Strategy (DBS) is a new concept of strategic management introduced by Mithas & Lucas (2010) in 2010 and developed by Bharadwaj et al. (2013) three years later. According to this concept, an organisation's strategy is formulated and implemented by using digital resources to create varied value generated by innovations that are disruptive to the existing technologies.

The concept of Industry 4.0 is defined by Bharadwaj et al. (2013) as a common term for the technology and concept of value chain organisation. A part of modular Smart Factories, cyber-physical systems monitor physical processes, create a virtual copy of the physical world and take decentralised decisions. Cyber-physical systems communicate and cooperate with one another and with humans in real time via the Internet of Things. Through the Internet of Service, participants of the value chain offer and use internal and cross-organisational services. So far, a lot of works have been published presenting the development and assumptions of Industry 4.0. (Bharadwaj et al., 2013; Camara & Tuesta, 2017; Kang et al., 2016; Radziwon et al., 2014).

Currently, enterprises are expected to constantly undergo strategic renewal through change management. 'With only a few decades of existence, there is much for the modelling research community to do' (Gray & Rumpe, 2019). Changes can be revolutionary (abrupt) or evolutionary (smooth) (Drnevich & Croson, 2013). Fast and frequent technological changes, which give rise to new solutions and business models, require a modern strategic manager to be able to think creatively, departing from the rigid rules of logical inference in favour of solutions that were formed in his/her imagination and have no justification

in the enterprise's previous knowledge or experience. 'Often, new strategies are not developed from facts, but thought up — if they are to be innovative and unique, they should not result from analysis, but rather from using imagination' (Kang et al., 2016).

The functioning based on digital technologies allows managers of smart enterprises to take right business decision faster and at any place. Data collection, cloud technology and mobility are the three mega trends that make it possible to combine the physical world with the digital one to support innovations, effectiveness and global economic development (PwC, 2017). The implementation of the idea of Industry 4.0, which is based on digitalisation of enterprises and the whole economy, requires radical changes in the existing business models (Radziwon et al., 2014).

Among widely known indices used for assessing the level of digitalisation of a country is Digitisation Index (DiGiX), which measures digital demand and supply at the level of economic sectors by means of 21 indicators. McKinsey & Company's analysis shows that Poland only uses 8% of its digital potential, with the gap in the level of digitalisation between Poland and Western Europe (average value for France, Holland, Germany, Sweden, Great Britain and Italy) being 34%. In terms of demand for digital resources, Poland only slightly lags behind Western Europe (the gap is 16%), whereas in terms of supply, the gap is much bigger, i.e. 44% (PwC, 2017). In terms of digitalisation, the most advanced sectors of the Polish economy are the following: finances, media, retail, specialist and business services as well as chemical and pharmaceutical sectors. The least advanced sectors include: healthcare, advanced industrial production, education, mining, energy sector and public utilities services, transport and simple industrial production (Hermann et. al., 2019). In the global ranking, Poland occupies 54th position in terms of digitalisation index (Bharadwaj et. al., 2013).

### 3. Methods

In 2012, the author conducted research among enterprises in Poland to assess the advancement level of digitalisation (level of virtualisation of contacts with customers, cooperation with suppliers and knowledge management) in this country. IBM's 2012 research and industry experience shows that strategic routes to transformation can be summarized by three basic approaches (Berman, 2012):

- focusing on customer value propositions;
- transforming the operating model;
- combining those two approaches by simultaneously transforming the customer value proposition and organizing operations for delivery.

Studies have been conducted using a survey questionnaire carried out among enterprises in Poland. A total of 346 enterprises participated in the study, including 143 micro enterprises, 104 small enterprises, 48 medium-sized enterprises and 51 large enterprises, including:



- 245 service enterprises and 101 manufacturing enterprises;
- 318 privately owned, 9 state-owned, 11 cooperatives, and 4 employee ownership enterprises;
- 61.2% — self-employed economic activity; 22.8% — capital companies, including 28 joint-stock companies and 51 private limited companies.; 4.6% partnerships;
- 60.1% enterprises operating 5 to 15 years; 5.2% — up to 1 year; 33.8 % — over 15 years, of which 24 (6.9%) operating over 30 years.

The findings of the research were confronted with the research conducted by PwC five years later (in 2017) on a much larger group of enterprises. The research was carried out among 2000 people employed in 9 different sectors of the economy in 26 countries, including Poland. The survey addressed the challenges and chances of the fourth industrial revolution. The comparative analysis only takes into account the findings related to enterprises in Poland.

## 4. Results

Polish entrepreneurs view the chances of Industry 4.0 very optimistically. Respondents rated the level of advancement of digital transformation in their enterprises very high, both compared to their direct competitors and enterprises from other countries. However, it is very likely that the participants of the survey were not fully familiar with the latest solutions used worldwide (Reis et al., 2018). According to IBM research from 2012, ‘companies seeking opportunities in an era of constant customer connectivity focus on two complementary activities: reshaping customer value propositions and transforming their operations using digital technologies for greater customer interaction and collaboration’ (Berman, 2012). A significant share of Polish companies is still at the stage of automating single workstations rather than creating ecosystems of devices that cooperate with one another without the participation of a human being (which characterises Industry 4.0). In order to assess the importance of virtualisation of contacts with customers in value creation in the analysed enterprises, the question about the impact of IT technologies on the quality of relations with enterprises’ customers was posed. Larger enterprises much more often declared higher expectations regarding the level of virtualisation of contacts with customers (table 1).

Based on the findings of the 2012 survey of Polish enterprises, it should be noted that most respondents now perceive the development in recent years as a huge leap and complex changes. A lot of Polish companies do not establish long-term strategies, but rather focus on fast and easy-to-introduce changes aimed at increasing production efficiency or cutting costs. The bigger the enterprise, the higher the level of information technologies used to acquire resources. In order to assess how virtual sourcing impacts an enterprise’s capacity for value generation, correlation was examined between the degree of virtualis-

ation of the configuration of assets in enterprises and their assessments of their economic and financial situations (table 2).

The study confirmed a positive, statistically significant moderate relationship between the level of virtualisation of the configuration of assets and the assessment of the economic and financial situation. The higher the level of information technology and tools used in establishing and maintaining contacts with suppliers, the better the assessment of the enterprise's economic and financial situation (Ziółkowska, 2013).

Only those enterprises that are technologically more advanced implement elements of Industry 4.0. The main obstacles that hinder a deeper digitalisation-related metamorphosis are high costs of its adoption and lack of necessary infrastructure (e.g. not enough broadband connections). However, the detailed findings of the research confirm huge optimism among Polish respondents. In each of the areas researched, the Polish results were better than the global average and much better than the 2012 research. This may have been a result of the accelerated development of Polish enterprises in recent years, often confused with full digital transformation. 'In some cases, the digital transformation in traditional organizations leads to two different modes of speed ('two-speed IT'). For performing digital innovation, a fast customer-facing and business oriented IT organization is established in order to react to rapidly changing customer needs. In addition, companies run the 'classical IT' with the established IT infrastructure and organization' (Horlach et al., 2016). At the same time, as many as 39% of respondents indicated that compared to their main competitors their enterprises were technologically advanced or highly advanced. 45% claimed that their companies were at the same level of virtualisation as their main competitors. In the 2017 survey, 54% of those surveyed declared that data played an important role in the decision-making process in their companies. Within the next 5 years, this share will increase to 87%. These results are close to global ones, which are 50% and 83% respectively. The next five years will be a period of a significant increase in investment outlays. In the last two years, they constituted 5.7% of companies' annual revenues on average, but they are expected to increase to 7.7% by 2020, which will translate into spendings of over PLN 100 billion annually. However as many as 83% of respondents were convinced that they would make a return on investment within five years' maximum.

Which areas do Polish enterprises want to develop? 29% of respondents claimed that their organisations were going to use digital technologies to modify the existing range of products, while 27% declared that their companies wished to add new, innovative products to their offers. The same share declared investments in data analytics services provided to other enterprises. However, full implementation of Industry 4.0 solutions will not be easy. For domestic companies, the biggest challenge may be securing the necessary financial resources. Another problem will be lack of support for employees from the managerial staff or a clear vision of how the changes should take place. Last but not

least, in many cases it will not be possible to tighten cooperation with business partners due to their organisational and technological immaturity. It is worth noting that the ranking of challenges that was created with the help of the participants of the global research differs somewhat from the one created based on the responses provided by Polish entrepreneurs. For most companies worldwide, the fundamental issue was the necessity of transforming organisational culture and appropriate trainings for employees. In Poland, only every fourth respondent considered it to be a huge problem. Despite these difficulties, it is safe to say that the representatives of Polish companies are very optimistic about the future and expect that the next steps they will take in the process of digital transformation will bring measurable benefits — mainly connected with efficiency. As many as 34% of respondents expect that it will improve by over 30%, whereas 40% expect that it will increase by 11% to 30%. According to 22% of those surveyed, the changes that are currently being introduced will contribute to over 30% reduction in costs, whereas 20% expect the same increase in revenues.

## 5. Conclusion

New business models are often based on generation of additional revenues through offering services in the area of data analytics or development of platforms (Kościelniak & Puto, 2015). Additionally, they focus on optimisation of interactions with customers (Matt et al., 2015). The basic assumption is also offering comprehensive solutions in a specific digital ecosystem. ‘In order to reach digital transformation and the creation of sustainable societies, first, none of the actors in the society can be seen in isolation, instead we need to improve our understanding of their interactions and interrelations that lead to knowledge, innovation, and value creation’ (Pappas et al., 2018). The deployment of Industry 4.0 solutions, and the implementation and successful use of new technologies represent a very complex and time-consuming process. Of fundamental importance is to create a strategy connected with digital transformation. ‘Today, companies face a challenge, which has been coined as ‘digitalization’ or ‘digital transformation’. As a reaction to this challenge, many companies see the need of establishing a new ‘digital IT’ unit or of shifting responsibility for IT systems to the business units. These changes should allow the business to be better informed, more flexible and faster in adapting its IT as well as its IT-enabled services and products to market opportunities and customer needs’ (Horlach et al., 2016). In order to develop it, it is necessary to determine how technologically advanced an organisation is and to set priorities for the next five years. A common mistake is to make necessary changes through the existing silo structure of a company. Meanwhile, the metamorphosis will only be successful if a holistic approach is taken making it possible to identify and use the strengths of an organisation as the foundations on which a comprehensive reorganisation will be based. It is also important to identify which systems functioning in an organ-

isation can be used and integrated in the future with new solutions. In the critical period of transformation, of fundamental importance is clear leadership, and equally important is commitment of all stakeholders, who will be engaged in the entire process and implementation of changes (Heavin & Power, 2018). It is thus important for everybody to know their role and for the objectives to be cascaded to further levels.

## References

- Berman, S.J. (2012). Digital transformation: opportunities to create new business models. *Strategy & Leadership*, 40(2). doi:10.1108/10878571211209314.
- Bharadwaj, A., El Sawy, O.A., Pavlou, P.A., & Venkatraman, N. (2013). Digital business strategy: toward a next generation of insights. *MIS Quarterly*, 37(2). doi:10.25300/misq/2013/37:2.3.
- Camara, N., & Tuesta, D. (2017). DiGiX: the digitization index. *BBVA Research Working Paper*, 3.
- Drnevich, P.L., & Croson, D.C. (2013). Information technology and business-level strategy: toward an integrated theoretical perspective. *MIS Quarterly*, 37(2). doi:10.25300/misq/2013/37.2.08.
- Gray, J., & Rumpe, B. (2019). Models as the subject of research. *Software and Systems Modeling*, 18(6). doi:10.1007/s10270-019-00751-y.
- Heavin, C., & Power, D.J. (2018). Challenges for digital transformation: towards a conceptual decision support guide for managers. *Journal of Decision Systems*, 27(sup1). doi:10.1080/12460125.2018.1468697.
- Hermann, M., Pentek, T., & Otto, B. (2016). Design principles for industrie 4.0 scenarios: a literature review. In T.X. Bui & R.H. Sprague (Eds.), *Proceedings of the 49th Hawaii international conference on system sciences*. Kauai: IEEE. doi:10.1109/hicss.2016.488.
- Horlach, B., Drews, P., Schirmer, I. (2016). Bimodal IT: business-IT alignment in the age of digital transformation. In V. Nissen, D. Stelzer, S. Strasburger, & D. Fischer (Eds.), *Multikonferenz Wirtschaftsinformatik (MKWI)*. Ilmenau: Universitätsverlag.
- Kang, H.S., Lee, J.Y., Choi, S., Kim, H., Park, J.H., Son, J.Y., ... Noh, S.D. (2016). Smart manufacturing: past research, present findings, and future directions. *International Journal of Precision Engineering and Manufacturing-Green Technology*, 3(1). doi:10.1007/s40684-016-0015-5.
- Kościelniak, H., & Puto, A. (2015). Big data in decision making processes of enterprises. *Procedia Computer Science*, 65. doi:10.1016/j.procs.2015.09.053.
- Matt, C., Hess, T., & Benlian, A. (2015). Digital transformation strategies. *Business & Information Systems Engineering*, 57(5). doi:10.1007/s12599-015-0401-5.
- Mithas, S., & Lucas, H.C. (2010). What is your digital business strategy. *IT Professional*, 12(6). doi:10.1109/mitp.2010.154.



- Pappas, I.O., Mikalef, P., Giannakos, M.N., Krogstie, J., & Lekakos, G. (2018). Big data and business analytics ecosystems: paving the way towards digital transformation and sustainable societies. *Information Systems and e-Business Management*, 16(3). doi:10.1007/s10257-018-0377-z.
- PwC. (2017). *Przemysł 4.0, czyli wyzwania współczesnej produkcji*. Retrieved 10.02.2019 from <https://www.pwc.pl>.
- Radziwon, A., Bilberg, A., Bogers, M., & Madsen, E.S. (2014). The smart factory: exploring adaptive and flexible manufacturing solutions. *Procedia Engineering*, 69. doi:10.1016/j.proeng.2014.03.108.
- Reis, J., Amorim, M., Melao, N., & Matos, P. (2018) Digital transformation: a literature review and guidelines for future research. In A. Rocha, H. Adeli, L.P. Reis, S. Costanzo (Eds.), *Trends and advances in information systems and technologies: advances in intelligent systems and computing*. Cham: Springer. doi:10.1007/978-3-319-77703-0\_41.
- Ziółkowska, B. (2013). *Zarządzanie procesami tworzenia wartości w przedsiębiorstwie: perspektywa wirtualizacji*. Częstochowa: Politechnika Częstochowska.

## Acknowledgements

Author contributions: author has given an approval to the final version of the article.

Funding: this research was funded by the Czestochowa University of Technology, Faculty of Management statutory sources.

Note: the results of this study were presented at *10th International Conference on Applied Economics Contemporary Issues in Economy* (June 27–28, 2019, Torun, Poland).





## Appendix

**Table 1.**

**Values of  $\chi^2$  and Yule's  $\phi$  coefficient for the use of information technologies and level of customer service**

Problem	$\chi^2$	p-value	$\phi$
the use of information technologies vs. level of customer service	46.793	0.0001	0.392

Source: Own preparation.

**Table 2.**

**Values of  $\chi^2$  and Yule's  $\phi$  coefficient for virtualisation level and enterprises' economic and financial situations**

Problem	$\chi^2$	p-value	$\phi$
level of virtualisation of the configuration of assets vs. assessment of an enterprise's economic and financial situation	26.983*	0.001	0.279

Source: Own preparation.

