Dominika Koszany
The School of Banking and Management in Krakow
koszany@student.wszib.edu.pl
Martyna Jakubiec
The School of Banking and Management in Krakow
jakubiec@student.wszib.edu.pl

DIGITAL TRANSFORMATION OF COMPANIES

Introduction

The phenomenon of digitization has continuously accompanied human activities since 1990s when the Internet and computers became widespread which resulted in the transfer of a significant part of sales to digital platforms. Digitization is progressing rapidly and is an integral element of the present-day economy. Social media, digital platforms and being abreast with the times are necessary to run business operations. The aim of the article is to present key concepts related to digitization and to show the significance of digitization and innovation in sales, logistics and education.

The article is focused on the analysis of the latest trends in digitization and its significance in company operations on various markets as well as different areas of social life.

1. Important concepts and opinions in digitization

Future Shock is the concept developed by A.Toffler, an American writer who devoted most of his work to the issues of digitization. He speculated that progressiveness would force a complete transformation of society due to the enormous impact of computers and the Internet on social communication as well as the economy, education, work, culture and society as a whole[1]. Toffler referred the term future shock to the disorientation that resulted from large changes occurring in a short period of time[2]. Despite the fact that he used this term for the first time already in 1965 in the Horizon[3] magazine article, this is a very current phenomenon affecting successive generations.

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[1] https://www.economist.com/news/2008/08/15/alvin-toffler?ppccampaignID=&ppcadID=&ppcgclID=&utm_medium=cpc.adword.pd&utm_source=google&ppccampaignID=18151738051&ppcadID=&utm_campaign=a.22brand_pmax&utm_content=conversion.direct-response.anonymous&gad_source=1&gclid=CjwKCAiAvJarBhA1EiwAGgZl0PX6KILGk6lTpiGvBBVpr89saYtWRd9P8JJ661--Sfe_vGYTNl8dmxoCwagQAvD_BwE&gclsrc=aw.ds (accessed: 29.11.23).
[2] A. Toffler, *Szok Przyszłości*, Wydawnictwo Zysk S-ka, Poznań 1999, p.14.
[3] Ibidem.

K.Schwab is a German engineer and economist, the founder and present executive chairman of The World Economic Forum (WEF) [4]. K. Schwab emphasizes potential threats related, among others, to job losses, cybersecurity, and the concentration of power and resources in large corporations. He also draws attention to potential social inequalities, data privacy problems and ethical issues related to artificial intelligence. Despite numerous challenges and threats, he often points to several benefits such as production effectiveness, innovativeness and the access to information and services[5].

D. Tapscott, a Canadian business theoretician, innovations consultant, author, speaker and advisor, is known for his research on technology impact, digital transformation, network society and blockchain economics. According to him, digitization, i.e., the process of moving to more digital and automated solutions, has the potential to bring numerous benefits but, on the other hand, it is also associated with challenges and consequences[6]. *Net – Generation* is one of his key concepts. The concept draws attention to changes concerning the new generation that is the first to grow up in the digital era. Tapscott points to the need to digitally transform organizations in the incoming era. He assumes that organizations must adapt to new technologies and the changing customer expectations in order to remain competitive. Digital transformation includes both technological innovations and changes in organizational culture, business processes and models[7].

2. The most important trends in digitization

Along with the technological development, new solutions and facilities are created for companies. They have a major impact on the changing approach to doing business and everyday social life. Solutions related to connectivity, data, automation and digital consumer access will ply a crucial role[8]:

- artificial intelligence (AI) –the development of machine learning, deep learning and robotics algorithms which help automatize and optimize processes in various areas.

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[4] https://instytutsprawobywatelskich.pl/o-klausie-schwabie-swiatowym-forum-ekonomicznym-i-globalistach-z-davos/ (accessed: 22.11.23).
[5] https://instytutsprawobywatelskich.pl/klaus-schwab-czwarta-rewolucja-przemyslowa/ (accessed: 29.11.23).
[6] https://dontapscott.com/speaking/digital-economy/ (accessed: 29.11.23).
[7] https://dontapscott.com/speaking/net-generation/ (accessed: 07.12.23).
[8] K. Bartczak, *Modele biznesu oparte na cyfrowych platformach technologicznych*, Difin, Warszawa 2023, pp. 27-29.

In simple terms, it is the combination of computer science and big data to facilitate problem solving[9].

- Internet of Things (IoT) – the development of technologies that enable communication between devices to obtain and process information, which allows for process automation in households, industries and other sectors[10].

- *Cloud computing* – the development of technologies that enable data storage and processing in the cloud, which gives access to resources and applications from anywhere in the world, while ensuring security and cost saving[11].

- *Big Data* – the development of technologies enabling the collection, storage and analysis of large amount of data, which allows acquiring knowledge and information that was previously unavailable[12].

- *Blockchain* – the development of technology enabling secure and reliable information processing and transmission as well as transactions without intermediaries. This is the storage of data in a distributed manner without centralizing it in one server when a combination of previously distributed data creates a logical whole[13].

- Cybersecurity – the development of technologies that provide protection against such online threats as hackers, viruses and DDoS attacks.

- Online education - the development of technologies enabling remote teaching and e-learning which are becoming increasingly popular due to their convenience [14].

- Augmented Reality (AR) and Virtual Reality (VR) – the development of technologies enabling interaction with the virtual world. AR overlays virtual reality

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[9] https://www.ibm.com/topics/artificial-intelligence (accessed: 07.12.23).

[10] https://www.coursera.org/articles/internet-of-things?adpostion=&utm_medium=sem&utm_source= gg&utm_campaign=B2C_EMEA__coursera_FTCOF_career-academy_pmax-multiple-audiences-country-multi&campaignid=20665163467&adgroupid=&device=m&keyword=&matchtype=&network=x&devicemodel =&adposition=&creativeid=&hide_mobile_promo&gclid=CjwKCAiA98WrBhAYEiwA2WvhOjiyuViM0DrhdP ezKo1C8UMHe_ZuVLBl7DVPvydC0P-x56QJIe8p9xoCrvcQAvD_BwE (accessed: 07.12.23).

[11] P. Szmit, *Cloud computing historia, technologia, perspektywa*, Polska Agencja Rozwoju i Przedsiębiorczości, Warszawa 2012, p. 4.

[12] K. Hauke, *Big Data w innowacyjności organizacji biznesowej*, [in:] *Innowacyjność to cyfryzacja i rozwój. Zarządzanie operacyjne w teorii i praktyce organizacji biznesowych, publicznych i pozarządowych*, Prace Naukowe WSZiP Vol.43, Wyższa Szkoła Zarządzania i Przedsiębiorczości, Wałbrzych 2017, pp. 59-60.

[13] https://www.parp.gov.pl/component/content/article/83965:nieunikniona-technologia-blockchain-dowiedz-sie-jak-odmieni-twoj-biznes (accessed: 07.12.23).

[14] https://www.economist.com/analects/2014/09/27/online-learning-is-becoming-more-popular?utm_medium =cpc.adword.pd&utm_source=google&ppccampaignID=18151738051&ppcadID=&utm_campaign=a.22brand_ pmax&utm_content=conversion.direct-response.anonymous&gad_source=1&gclid=CjwKCAiA98WrBhAYEiwA2WvhOmdQ9HTaH7IrPxCNB4anSH ysa6LCbDEtv9opJex9BidCfw0p6icbVxoC9JMQAvD_BwE&gclsrc=aw.ds (accessed: 07.12.23).

over physical reality, while VR is fully based on digital reality. However, mostly through computer games, VR glasses, which enable moving into other reality in a more vivid way, are gaining in popularity[15].

3. Implementation of digitization in companies

The implementation of digitization is an individual issue for every company but several universal features can be indicated. Apart from developing the competencies of employees, their education and skills to operate modern solutions are necessary. This involves the need to train the staff or to employ IT specialists.

Another crucial element is the focus on data security and protection. When implementing digitization, it is important to ensure adequate security measures such as data encryption and protection against unauthorized access in order to protect the privacy and security of company data.

The final element of the implementation of digitization is the necessity to personalize production in the context of Industry 4.0. Modern approach to production is based on product and service personalization so that they are adapted to individual customer needs with the use of digital technologies such as IoT, Big Data, AI and robotics[16].

To analyze the applications of innovations, it is worth focusing on the greatest e-platforms such as Allegro, which concentrates on the Polish market, and Amazon, which operates globally.

Allegro has been operating since 1990s. At present, it is the largest e-commerce company from Europe. The platform offers to its customers a mobile application, a loyalty program with benefits for permanent customers, transactions security and its own logistics solutions such as "same day delivery" [17]. Allegro constantly increases its sales. In Q2 2023, " GMV in Poland increased by 11.3% in comparison to the previous year and reached PLN 13.48 billion in Q2, which exceeded the growth rate of retail sales"[18].

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[15] https://www.forbes.com/sites/ariannajohnson/2023/06/02/augmented-reality-ar-vs-virtual-reality-vr-whats-the-difference-and-how-do-they-work/amp/ (accessed: 07.12.23).
[16] K. Grzyb, *Cyfryzacja przedsiębiorstw produkcyjnych w Unii Europejskiej w perspektywie koncepcji Przemysłu 4.0,* [in] *Zarządzanie operacyjne w teorii i praktyce organizacji biznesowych, publicznych i pozarządowych*, Prace Naukowe WSZiP Vol.43, Wyższa Szkoła Zarządzania i Przedsiębiorczości, Wałbrzych 2017, pp. 91-95.
[17] https://businessinsider.com.pl/firmy/historia-allegro-firmy-ktora-wygnala-shopee-z-polski/zjg3lcw (accessed: 22.11.23).
[18] https://businessinsider.com.pl/biznes/allegro-zwieksza-monetyzacje-i-przychody-z-reklam-wzrost-o-184-proc/8hkv3l1 (accessed: 29.11.23).

On the other hand, Amazon, as a global company, not only offers what the Polish pioneer does, but also invests heavily in artificial intelligence along with machine learning, Amazon Web Services cloud computing, Amazon Advertising service[19] and a loyalty program that offers sales benefits and access to films and series.

According to the experts from Sociomantic Labs, regardless of whether a company operates locally or globally, the loyalty program, personalization of advertising and mobile payments are the factors with the greatest impact on e-commerce sales[20].

4. The role of digitization in logistics

The role of digitization in logistics is significant as logistics is a sector that includes the coordination of supply chain, planning and organization. It requires high precision and attention[21] and digitization offers here a significant support. Thanks to the automation of storage and transport processes, it is possible to increase the capacity and efficiency of logistics systems. The use of Automatic Identification and Data Capture (AIDC) technologies such as bar codes or Electronic Product Code (EPC) technology, which allows for monitoring products at any stage of the supply chain, will be of crucial importance[22]. The coordination of operations can be improved, among others, by cloud computing or IoT. The use of AI and data analysis may also be important as it allows for a quicker reaction to unpredicted problems such as delays in the supply chain or shortage of products. Data analysis can be invaluable in optimizing transport routes and costs.

5. Education and developments in technology

In the discussion about digitization, one cannot ignore education, where innovativeness should play a key role. School digitization is a process in which traditional teaching methods are replaced by modern technologies and digital tools. Modernizing the education system results in several benefits such as increased teaching effectiveness, the development of students' technological skills and a greater accuracy of the content provided.

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[19] https://www.bigcommerce.com/ecommerce-answers/what-is-amazon-advertising/ (access: 29.11.23)

[20] cf. „Barometr *e-commerce* 2016" http://www.stegroup.pl/attachments/article/628/R%209.pdf (accessed: 29.11.23).

[21] Ł. Marzantowicz , *Inteligentna technologia w zarządzaniu logistycznym i łańcuchem dostaw*, „Kwartalnik Nauk o Przedsiębiorstwie", 2019, No. 1.

[22] K. Nowicka, M. Szymczak, *Logistyka i łańcuchy dostaw w obliczu czwartej rewolucji przemysłowej*, Biuro Analiz Sejmowych 2020.

The digitization of education is an indispensable tool to achieve the main educational aim, i.e. the development and well-being of students and teachers. The process includes the development of Information and Communications Technology (ICT), the modernization of the infrastructure and the content and resources enrichment. For a school to be successful, it must define its educational goals and use the technology in areas where it is necessary and justified. A correct implementation of digital technologies may result in better education results and an increase in the teaching process effectiveness[23].

Digitization in education requires changes in the entire education system and they should not be limited only to the purchase of new ICT equipment. New approach to the teaching process and education management is necessary. Teachers, students, school principals and educational institutions should be prepared to these changes.

Considering the rapid development, the educational system faces numerous challenges such as the increased costs or the obligation to train teachers on an ongoing basis to understand modern technologies properly. Nevertheless, the benefits of the changes should definitely outweigh any disadvantages. Diagram 1 shows that the most important benefit of the implementation of modern technologies to the educational system is the possibility to learn from any place in the world. The second-best benefit is the opportunity to monitor the learning process. Digitization may offer the possibility to teach on a completely new level and this opinion is shared by many parents.

One should mention here the world-famous STEAM education approach, which is an educational initiative of the Rhode Island School of Design. It is based on five key thematic blocks: science, technology, engineering, arts and mathematics. The purpose of STEAM is to teach to think innovatively, take risks to collaborate, solve problems creatively and take part in creative processes. The presence of arts in the system is significant as it engages the brain and coordinates the learning process in a natural way. The STEM model used only the left-brain hemisphere, which is responsible for logical thinking and analysis, while adding the area of arts (referred to by the letter A) results in the use of the right-brain hemisphere, which is responsible for creativity, intuition and abstract thinking. This system is extremally innovative and developmental for the education system, students and teachers[24].

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[23] M. Konieczniak, *Cyfryzacja szkoły a jakość edukacji*, Vucan Sp. z.o.o, Wrocław 2012.
[24] Ibidem.

Diagram 1. Role of digital technologies in the teaching process in the opinion of parents
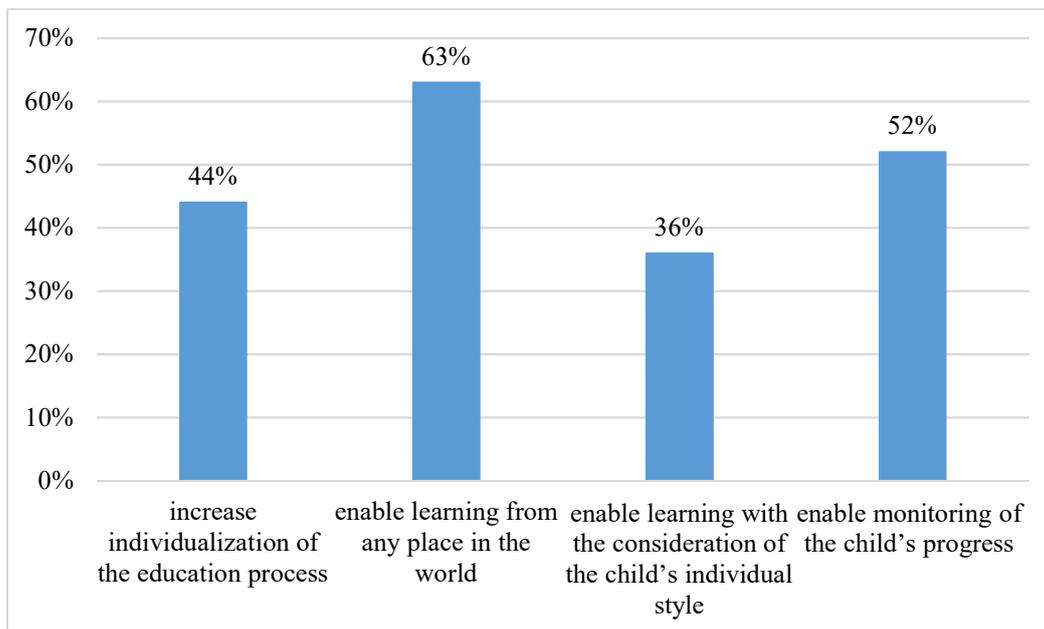
Source: M. Plebańska, *Stan cyfryzacji polskich szkół na podstawie badania „Polska szkoła w dobie cyfryzacji. Diagnoza 2017" w kontekście potrzeby wdrożenia nauczania w modelu STEAM*, Uniwersytet Warszawski, „Interdyscyplinarne Konteksty Pedagogiki Specjalnej" 2018 No. 23/2018, . 64-65.

Conclusions

Digitization is a key element of social life, economy, logistics and education. Innovativeness is an integral part of the 20th and 21st centuries, and the digitization process is subject to the analysis of the most outstanding economists, engineers, writers and lawyers. Developing one's business requires staying up to date with trends and innovations. Implementing new solutions and investing in technologies is necessary if a company wants to be visible or even beat the competition. Innovations are constantly being implemented and the market, as well as the consumers, are quickly raising their expectations towards a rapidly developing technology. By observing a constant development in e-commerce, logistics and companies, it can be concluded that the development of the education system in terms of modern technologies is inevitable and necessary in today's world.

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praktyce organizacji biznesowych, publicznych i pozarządowych, Prace Naukowe WSZiP Vol.43, Wyższa Szkoła Zarządzania i Przedsiębiorczości, Wałbrzych 2017.

[3] https://instytutsprawobywatelskich.pl/o-klausie-schwabie-swiatowym-forum-ekonomicznym-i-globalistach-z-davos/.

[4] https://www.economist.com/news/2008/08/15/alvin-toffler?ppccampaignID=&ppcadID=&ppcgclID=&utm_medium=cpc.adword.pd&utm_source=google&ppccampaignID=18151738051&ppcadID=&utm_campaign=a.22brand_pmax&utm_content=conversion.direct-response.anonymous&gad_so.

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[6] https://dontapscott.com/speaking/net-generation/.

[7] https://dontapscott.com/speaking/digital-economy/.

[8] https://www.ibm.com/topics/artificial-intelligence.

[9] https://www.coursera.org/articles/internet-of-things?adpostion=&utm_medium=sem&utm_source=gg&utm_campaign=B2C_EMEA__coursera_FTCOF_career-academy_pmax-multiple-audiences-country-multi&campaignid=20665163467&adgroupid=&device=m&keyword=&matchtype=&network=x&devicemodel=&adposition=&creativeid=&hide_mobile_promo&gclid=CjwKCAiA98WrBhAYEiwA2WvhOjiyuViM0DrhdPezKo1C8UMHe_ZuVLBl7DVPvydC0P-x56QJIe8p9xoCrvcQAvD_BwE.

[10] https://www.parp.gov.pl/component/content/article/83965:nieunikniona-technologia-blockchain-dowiedz-sie-jak-odmieni-twoj-biznes.

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[12] https://www.forbes.com/sites/ariannajohnson/2023/06/02/augmented-reality-ar-vs-virtual-reality-vr-whats-the-difference-and-how-do-they-work/amp/.

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Abstract

Digitization initiated several changes and many of them are crucial to present-day economy and social life. Social media, digital platforms and striving for innovation are inherent elements of business in the 21st century. The article is focused on the analysis of the latest trends in digitization presenting the concepts and opinions of Alvin Toffler, Klaus Schwab and Don Tapscott.

The article also discusses topics related to Artificial Intelligence, Internet of Things, cloud computing, Big Data, blockchain, cybersecurity, online education and the technologies of virtual reality.

In the context of e-commerce, Allegro and Amazon represent slightly different approaches – Allegro concentrates on the Polish market, while Amazon acts globally, investing intensively in artificial intelligence. Nevertheless, both companies take advantage of several similar facilities for their customers and, consequently, they are pioneers in their segments.

The role of digitization in logistics is also significant as it improved numerous logistics processes through such aspects as artificial intelligence, data analysis, Internet of Things and cloud computing.

The rapid technological development also exerted impact on education. Digitization is also transforming the teaching process as it requires changes both in pedagogical approaches and the infrastructure. Initiatives like STEM, which teach students to think innovatively, collaborate and solve problems creatively, may prove to be the future of learning.

Digitization is crucial both in running a business and everyday social life. Technological changes and new solutions may be shocking and difficult to understand for many people but they also bring many benefits. Obviously, the continuous development of technology has become a basic element of functioning in the 20th and 21st centuries. However, it should be closely monitored and improved in terms of safety due to the threats is involves.

Key words
Digitization, STEAM, education, logistics, e-commerce, technology.