

ECONOMIC DETERMINANTS OF THE ECONOMY AND ENTERPRISE IN THE CONDITIONS OF DIGITAL TRANSFORMATION

Robert Janczewski, PhD Eng.

Ignacy Mościcki University of Applied Sciences in Ciechanów, Poland

Katarzyna Szymańska, PhD

Ignacy Mościcki University of Applied Sciences in Ciechanów, Poland

Abstract: *The purpose of this article is to show the impact of digitization and robotization on both national and international economies; on workers, their competencies and skills. This article also identifies problems related to the functioning of the economy and enterprises under the conditions of digital development of societies. The starting point of the work is the concept that the activity of the enterprise affects the economic development of the state and enterprises, but due to too quick progress and development there is a noticeable lack of tools to measure and evaluate this impact.*

Keywords: *economies, work, skills, competencies, problems in digital development*

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Introduction

Automation, artificial intelligence and robotization in the modern world have a major impact on the economic development of societies, the job market and the employees of both state and non-state, military and non-military entities. They influence their form, nature, structure and directions of development. The intensification and progression of the use of developing and improved technologies and technical solutions in combination with people, operations and production processes, the permanent influx of data and information, and the evaluation of knowledge verify people's occupations and enable companies to quickly adapt to the needs of the environment (e.g., customer preferences or market demands), stimulate development or innovate. The purpose of the article is to highlight the importance of the impact of the development of digitization and robotization on both national and international economies. The article also indicates its impact on the job market forcing workers to learn new competencies and skills. This article also indicates the problems associated with the functioning of the economy and enterprises under the conditions of digital development of societies. The starting point of the work is the assumption that the activity of the enterprise in the era of digital transformation influences the economic development of the state and enterprises, but because of too rapid progress and development, there is a noticeable lack of tools to measure and evaluate this impact.

Digitization and automation in the economy and enterprise

Increasing digitization and automation is used for repetitive or programmed tasks is changing the economy. Space and time have lost their paradigm, as a result of the

convergence of the real and virtualized worlds, access to information and data processing have become commonplace and simple. The Internet of Things (IoT)-which is a network of objects, processes and people constantly sending and receiving digital data-has emerged. Analyzing data for patterns, trends and correlations makes it easier to develop processes, increasing efficiency and productivity. Today, hyperconnectivity has emerged; devices continuously process very large amounts of information (big data analytics, abbreviated BDA), providing detailed, accurate and actionable analysis and reports. Some of the services are done in cloud computing (cloud computing), allowing organizations to customize their own infrastructure and quickly change or automate workflows. Omni-channel product distribution and the sharing of 24/7 digital customer access to goods and services are being observed. The vision of smart factories, manufacturing, homes and cities is being realized. Faster connectivity, ubiquitous Internet access, declining data and information processing costs, and cloud solutions are supporting data and information analytics that enable the personalization of goods production and service delivery. Globally, smart factories with devices incorporating smart sensors for real-time data collection are on the rise, and new corporate standards for the skills of potential employees are gradually emerging (Alerger Augmented Reality, 2022).

The implementation of algorithm-based systems, robotics and automation translate into greater production efficiency, better quality control, competitiveness and resilience. Competitive advantage is becoming increasingly determined by the ability to make use of data and information, and a business model based on a platform that connects market parties through the latest technology and technical solutions (Włoch & Sledziwska, 2019).

The use of the newest technical solutions and technologies also affects the form and nature of work – robots are replacing humans, which affects the reduction of jobs for humans, host entities are increasingly using artificial intelligence. The spread of the latest technical solutions and technologies in many industries and professions, the increasingly cheaper cost of implementing modern (cutting-edge) solutions and the need to reduce costs mean that more and more professions can be performed not by a human worker but by a machine worker. This doesn't just apply to a robot working on a production line. Unmanned aerial vehicles (BSP), or drones (abbreviated UAV), robots, computers, unmanned checkout counters, computerized assistants at airports or offices, bots in call centers or artificial intelligence are able to do the job of a salesman in a store, movie theater and gas station, informants at customer service points. The dynamic development of technical solutions and technologies, unknown until those times, makes it possible to quickly replace a person performing repetitive and routine activities, both physical and mental (Polish Agency for Enterprise Development, 2022). In the financial services sector, digital transformation provides personalized services, free and remote access to financial planning or loan management. In retail, it can automate, optimize and speed up shopping by installing self-service checkouts, completely unmanned outlets (e.g., in Polish conditions – Żabka nano) or creating dark stores – warehouses from which couriers deliver goods directly to consumers making purchases via the Internet or apps. Commerce can also personalize suggestions of products going to customers.

Technique and technology are also being used in companies. The pace of introduction of changes to various departments of companies has been accelerated by

pandemic (Szymanska, 2021: 38). Recruitment platforms have emerged, allowing recruiters to manage and monitor the entire hiring process starting with publishing job postings, collecting applications, managing interview schedules and tracking the progress of recruitment. Such platforms can also automatically screen applications based on specific criteria, send emails or text messages to selected candidates, and allow for video recruiting or online testing. In addition to HR departments, digital solutions are being used in finance, manufacturing and customer service.

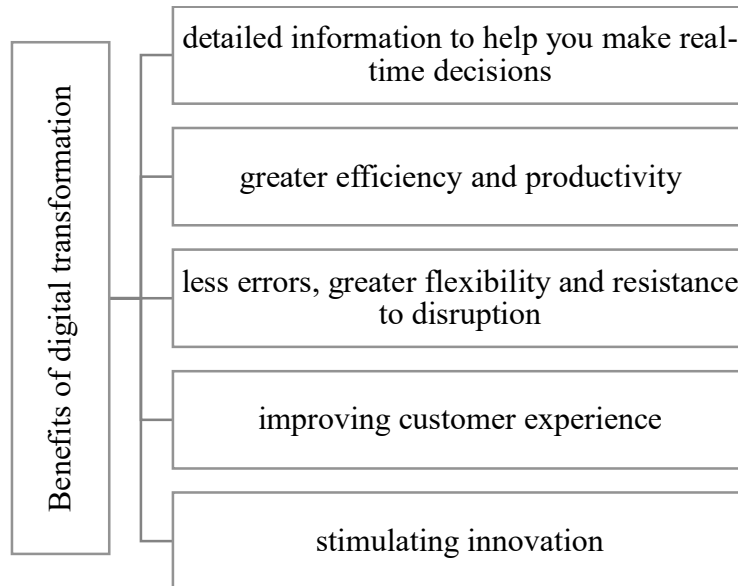


Figure 1 Benefits of digital transformation in enterprises
Source: own study.

Labor market

Widespread computerization has changed and continues to change the work of many professions, and automation and robotization are reshaping the whole labor market (Schwab, 2015). Analyzing the market, it can be seen that global demand for labor, especially low- and medium-skilled labor is significantly decreasing (World Economic Forum, 2022), demand for certain occupations is increasing and decreasing. The nature of work is also changing – it is more flexible as to its time and place, its nature and the conditions and methods of its performance. Remote work especially of IT or service technicians, store platforms, virtual assistants does not have a structured working day – it takes place late at night, ignoring breaks and weekends (Florida, 2002) – there is talk of a 24/7 economy (24/24; 7/7), creating demand for many services provided at unusual times (catering, health care, shopping, elderly and child care, further education). New market trends show that the familiar labor market is becoming a thing of the past (Bergen & Eidelson, 2018).

Analyses of the labor market show that this market will become increasingly flexible in the future, full-time employment with a single employer will become increasingly rare, and the work itself will increasingly involve collaboration with machines and algorithm-based systems. Keeping the best employees will become a problem. Companies will begin to compete for them, invest in training to improve their

qualifications and skills, create appropriate working conditions for them, promote healthy lifestyles, listen to their employees' opinions and analyze their needs.

Work will also disconnect from the concept of a profession learned in a long process of education and carried out throughout life until retirement. Until now, workers have defined themselves by the fact that they are electricians, sociologists or computer scientists. It will also become increasingly difficult to plan a linear and predictable career path (Szulczewski, 2018: 31-53).

Technological development also has some risks – the possibility of conflicts over automation and robotization, reduction in employment, increased requirements for operating automated systems, excessive standardization of products and services, the possibility of new crimes, increased unemployment through automation of some jobs, reduced employment in industry and agriculture, increased generation gap, and the need for often reskilling (Goban-Klas & Sienkiewicz, 1999).

Employee in the digital age

The digital revolution is a time of change caused by the development of computerization and modern technology. It is characterized by fast technological progress, dynamic technical development, common digitization and its impact on all areas of life. For the information society, the strategic resource, instead of capital and labor, becomes knowledge (Balcewicz, 2019), which affects the transformation not only of production and management systems, but also the transformation of all areas of life and people's mentality, causing numerous social, economic and business consequences (Skrabacz & Lewińska- Krzak, 2022: 134).

Analyzing the emerging labor market, one notices a change in the valuation of workers' skills. The pandemic has shown that technical and digital competencies¹ (understanding of advanced digital technologies, the ability to develop and adapt them and use them in daily work to solve problems in the plant) are very important among those working and newly recruited, and are now necessary in the labor market. Employers note that employees skilled in these areas are critical to business growth. Digitally incompetent employees can cause damage to a company, for example, by using programs inappropriately, applications that are inconsistent with the company's security policy or obtained from insecure sources (Polish Agency for Enterprise Development, 2022).

In addition to hard (digital)² competencies, soft competencies are also important, differentiating human work from that of information systems, robots or artificial intelligence, showing areas where humans will still be difficult to replace. Skills that organizations need today – creativity (understood as curiosity, originality representing the greatest value, the impulse to act in the new era of the digital world), resilience (the ability to positively adapt and cope with crisis situations and adapt to the conditions of the changing world, resilience to these changes and the ability to regenerate), digital fluency (readiness, flexibility and openness to use digital tools and to continually learn and grow), teamwork, a problem-solving approach, and an understanding of how to use

¹ Competencies are a set of acquired knowledge, skills and attitudes and personality traits.

² The importance of digital competencies as key competencies is recognized by the European Union, Official Journal of the EU.

digital technologies – provide the necessary foundation to help future employees think, act and grow in a digital world that is unpredictable and changing faster. They are needed to deal with the challenges of a flexible labor market and job instability (pwc, 2020, 18).

Economic challenges of digital transformation

The economic challenges of running businesses under digital transformation can be considered at both the state and enterprise levels.

To measure economic development in macroeconomic analysis, Gross Domestic Product (GDP, abbreviated GDP) is generally used, which is a measure of the amount of output produced by productive factors located in the territory of a country, regardless of who owns them (Begg D., Vernasca G., Fisher S., Dronbush R., 2014). However, it is not the best indicator, as it does not include many effects and changes, if only those associated with the development of the digital economy. Robotization and automation of production, the use of collected and transmitted data significantly affects the running of businesses, so this translation into GDP is not visible. Many digital goods – games, apps, movies, music, texts – are available for free on the Internet, making it difficult to capture them due to the zero price in the market and the lack of reliable data valuation. They do, however, have a value that can and should be measured indirectly, e.g. the time spent playing, listening, watching them (the so-called attention economy). In addition, all users of digital goods pay „non-financially” for access to them if they become customers of advertising or providers of data (Growiec J., 2021).

Companies are investing more and more money in implementing new technical solutions and technologies, systems and tools based on IT solutions. Their purpose is to strengthen competitive advantage, increase the organization's profitability, reduce costs, improve process efficiency or increase customer and employee satisfaction. Successful implementation takes place when the resources invested in them bring measurable benefits including increased income, productivity, improved reputation, sustainability, improved quality of products and services, market share, change in price or production costs, etc. The measurable success of a technology transformation, can be measured by achieving the maximum return on investment in technology. However, it is difficult to estimate whether a given investment will bring the expected benefits. It is also difficult to select the right indicators to estimate their amount. One interesting and used indicator is the Return on Technology Investment (ROTI), which takes into account: organizational efficiency and profitability after technology implementation, customer satisfaction and employee satisfaction (pwc, 2023).

A challenge associated with digital transformation is the security of the data and information collected and processed. As organizations expand their digital footprint, protecting the availability, integrity and secrecy of their systems becomes a necessity. Connected equipment and the data it generates create not only opportunities, but also risks: from production and testing to installation and service. Security breaches can result in production downtime or data loss that affects customer loyalty and the bottom line, which is why investments in cyber security are on the rise.

Conclusion

In conclusion, automation, robotization, artificial intelligence are becoming an indispensable part of any business activity. Technologies and state-of-the-art digital solutions make it possible to accelerate the circulation of information, collect data that provide decision-making bases for managers. As a result of digital transformation, production and consumption processes, the nature of work, forms of employment and business models are changing. Many functional areas in companies, thanks to information systems, have been automated, simplified, as well as organized into logical processes, eliminating unnecessary, repetitive activities. Digital technologies make it possible to reduce the time it takes to bring new products or services to market, and facilitate relations with external business partners, suppliers and customers.

The progress of robotization and automation in the labor market shows an increase in demand for employees with digital competencies, which are a determinant of professional standing in a digitized world. The labor market will find such employees who, based on advanced social, analytical and technical (including digital) competencies, will be able to adapt their skill profile to the quickly changing expectations of employers and customer needs.

Challenges in analyzing and monitoring the effects of digital transformation, the development of the economy and businesses is the development of indicators that measure the impact on the economic development of the state and businesses, which will take into account the fast progress and development of the field. Another challenge is security, which requires a systems approach to managing data, information flow processes, infrastructure and managing employee skills.

REFERENCES

Journal article

SKRABACZ, M. LEWIŃSKA-KRZAK, Wpływ rewolucji cyfrowej na rozwój społeczeństwa informacyjnego oraz społeczną wartość informacji, *Roczniki Nauk Społecznych*, Tom 14 (50), numer 1 – 2022, DOI: <https://doi.org/10.18290/rns22501.12>, p. 134.

Monographs

BALCEWICZ J., Społeczeństwo informacyjne w czasach cyfrowej rewolucji – o zjawisku, 2019.

BEGG D., VERNASCA G., FISHER S., DRONBUSH R. (2014), *Makroekonomia*, PWE.

FLORIDA R., *The Rise of the Creative Class: And How It's Transforming Work, Leisure, Community and Everyday Life*, Basic Books, New York 2002.

GOBAN-KLAS T., SIENKIEWICZ P. (1999), *Społeczeństwo informacyjne: szanse, zagrożenia, wyzwania*, Kraków: Wydawnictwo Fundacji Postępu Telekomunikacji.

JANCZEWSKI R. (2020), *Cyberbezpieczeństwo – ponadsektorowa kategoria bezpieczeństwa narodowego* [w:] R. Jakubczak, *Współczesna obrona narodowa*, Fundacja historia i kultura, Warszawa.

JANCZEWSKI R. (2022), *Potrzeby informacyjne organizacji*, [w:] W. Scheffs (red.), *Konteksty teoretyczne i praktyczne informacji w organizacji*, Wydawnictwo Naukowe Akademii Kaliskiej, Kalisz.

- PWC, (2020), 13 faktów o transformacji cyfrowej... czyli wszystko co chciałbyś wiedzieć o cyfryzacji, ale bałeś się zapytać, Digital Shapers, Fundacja digitalpoland, Warszawa, p. 18.
- SZULCZEWSKI G. (2018), W poszukiwaniu sensu życia w świecie bez pracy, [w:] Świat (bez) pracy. Od fordyzmu do czwartej rewolucji przemysłowej, red. J. Czarzasty, C. Kliszko, Oficyna Wydawnicza SGH, Warszawa, pp. 31–51.
- SZYMAŃSKA K. (2021), Zarządzanie w pracy zdalnej, [w:] Instrumenty zarządzania jako odpowiedź na uwarunkowania zewnętrzne otoczenia organizacji, Szymańska K. (red.) Wydawnictwo Naukowe FNCE, Poznań, p. 38.
- SZYMAŃSKA K. (2022), Organizacja i zarządzanie w pracy zdalnej – perspektywa pracownika i pracodawcy, [w:] Wirtualna rzeczywistość w perspektywie nauk społecznych – pedagogiki, psychologii i zarządzania, Żuchowska – Kotlarz E., Tokarski A. (red.), Wydawnictwo: Akademia handlowa Nauk Stosowanych w Radomiu, Radom, tom I, p. 243.

Internet sources

- ALERGER AUGMENTED REALITY, Co mogą zrobić firmy?, [online], [16.06.2022], <https://alegerglobal.com/pl/rzeczywistosc-rozszerzona/obszary-zastosowania/smart-factory/>.
- BERGEN M., EIDELSON J., Inside Google's Shadow Workforce. About Half of Google's Workers Are Contractors Who Don't Receive the Same Benefits as Direct Employees, [online], [25.06.2018], https://www.bloomberg.com/news/articles/2018-07-25/inside-google-s-shadow-workforce?utm_source=pocket&utm_medium=email&utm_campaign=pockethits.
- CYBERPOLICY, Społeczeństwo informacyjne w czasach cyfrowej rewolucji – o zjawisku banki informacyjnej i jego następstwach, <https://cyberpolicy.nask.pl/spoleczenstwo-informacyjne-w-czasach-cyfrowej-rewolucji-o-zjawisku-banki-informacyjnej-i-jego-nastepstwach/>, [online], [04.10.2019].
- OFFICIAL JOURNAL OF THE EUROPEAN UNION, Recommendations, Council, Council Recommendation of May 22, on key competencies for lifelong learning, (2018/C 189/01), [online], [04.06.2018], [https://eur-lex.europa.eu/legal-content/PL/TXT/PDF/?uri=CELEX:32018H0604\(01\)&from=en](https://eur-lex.europa.eu/legal-content/PL/TXT/PDF/?uri=CELEX:32018H0604(01)&from=en).
- Future of Jobs, World Economic Forum 2022, [online], [11.2022], https://www3.weforum.org/docs/WEF_Future_Readiness_of_SMEs_and_Mid_Sized_Companies_A_Year_On_2022.pdf.
- GROWIEC J., Wychodząc poza PKB: jak mierzyć rozwój gospodarczy w erze cyfrowej?, [online], [13.10.2021], <https://forsal.pl/gospodarka/artykuly/8268482,wychodzacz-pozapkb-jak-mierzyc-rozwoj-gospodarczy-w-erze-cyfrowej.html>.
- POLSKA AGENCJA ROZWOJU PRZEDSIĘBIORCZOŚCI, Kompetencje cyfrowe – niezbędny każdego pracownika, [online], [12/04.2022], <https://serwis-uslugirozwojowe.parp.gov.pl/component/content/article/79901:kompetencje-cyfrowe-niezbednik-kazdego-pracownika>.
- PWC, Inwestycje w technologie: jak osiągnąć maksymalne zwroty? [online], [05.2023], Raport, <https://www.strategyand.pwc.com/pl/pl/publikacje/2023/inwestycje-w-technologie-jak-osiagnac-maksymalne-zwroty.html>.
- SCHWAB K., The Fourth Industrial Revolution. What It Means and How to Respond; Foreign Affairs, [online], [12.12.2015], <https://www.foreignaffairs.com/articles/2015-12-12/fourth-industrial->

revolution?utm_campaign=reg_conf_email&utm_medium=newsletters&utm_source=fa_registration.

WŁOCH R., ŚLEDZIEWSKA K., Kompetencje przyszłości. Jak je kształtować w elastycznym ekosystemie edukacyjnym?, [online], [02.2019], https://www.delab.uw.edu.pl/wp-content/uploads/2019/09/Kompetencje_przyszlosci_Raport_DELabUW.pdf.

WORLD ECONOMIC FORUM, *The Future of Jobs Report 2020 OCTOBER 2020*, s. 30, [online], [10.2020], https://www3.weforum.org/docs/WEF_Future_of_Jobs_2020.pdf.