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## Developing digital skills in Economy 4.0

### Abstract

The aim of the paper is to evaluate digital competence among employees working with high-tech devices and identify their level of compliance with the requirements set out in EU documents. The article contains an analysis of the literature on the subject, EU documents and survey results. A comparative analysis of the opinions of employees, managers and trade union representatives is carried out based on the results of a survey in an industrial company where stationary work is required. The results show that in the Greater Poland (Wielkopolska) region of Poland, the level of employee qualifications is average. People employed for a period of five years or less positively assessed their level of competence and were positive about the challenges ahead; they also expressed a high degree of motivation to learn in the future. The positions of the managers and the union representatives were similar. The main implications include the fact that the level of digital skills found may form the basis for necessary steps to be taken by companies and public institutions to upgrade employees' skills. The article assesses the current level of digital competence of employees and the extent to which they adhere to the requirements of the literature, EU documents and national surveys.

**Key words:** digital skills, employers, managers, digitization, Poland

### 1. Introduction

The recent changes in the economy have involved the development of technology, while the job market is their inseparable recipient. The production of goods and services in the economy is currently saturated with the implementation of new technologies that require changes while

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simultaneously increasing the knowledge and professional qualifications of existing employees and developing new competences and skills for future employees in training. On the one hand, action is needed to increase the potential of the workforce; on the other hand, educational measures are necessary to adapt human capital to the use of technology and creative thinking.

The question of the adaptation of labor resources to technological solutions is now quite often addressed to many social groups. One such group is the employees of manufacturing companies in the Greater Poland region of Poland, where digitization has already been implemented in the form of high-tech devices.

The notion of Economy 4.0 is associated with the development of digitization in many areas of life. The term Economy 4.0 can be defined as in-depth digitization and the progressive automation of industrial and service processes. This new concept of the economy stems from the increased use of advanced IT systems, artificial intelligence, big data and the Internet of Things (Europe's Digital Progress Report 2017, pp. 5). The advent of this economic system is treated as the historic period embedded in technological development. The so-called Fourth Industrial Revolution marks the next timeframe of the era, which concerns advanced automation (Deakin et al. 2018; Nawrot 2019).

The development of human capital in companies leads to a subjective and objective perception of employees. This relates explicitly to educating employees in creative thinking and the effective use of ICT infrastructure. Technological progress is both replacing human labor, as it did in the nineteenth century during the industrial revolution, and changing the nature of work performed (Deakin, Markou 2018). This progress is eliminating structured and repetitive activities, and more and more mental activities. There already exists a catalog of office work and business services in the field of machine learning. The role of information technologies in Poland is still growing due to the high interest in locating international shared service centers there.

The results of the *International Adult Competence Survey* suggest that the level of employee competence in Poland is improving, but a significant part of the population will have problems finding a place on the job market and gaining access to appropriate education (OECD 2019c). *The State of Maturity* report lists a number of reasons for unequal access to education, including a lack of teachers with the necessary skills, homogeneous cultures, resistance to change caused by rigid systems, a lack of vision on the value of techniques – which is related to a lack of knowledge on the strategic use of information – and a lack of

resources, which presumably comes from choosing and investing in the right technology (Industry 4.0 implications for higher education institutions 2019).

Furthermore, another problem relates to unequal access to information. When a country has a robust ICT infrastructure but lacks qualified graduates to work in high-tech jobs, industry still has difficulties finding people with the right competencies and practical knowledge to work. Furthermore, high costs and a lack of basic digital skills among a large portion of the population make access to information unequal (Industry 4.0 implications for higher education institutions 2019).

On the basis of the above-mentioned issues constituting the multidimensionality of digitization, the main question arises as to employees' competences with high-tech devices and their level of compliance with the requirements of EU documents. In this context, the secondary aim of the article is to analyze employees', trade union (TU) representatives' and managers' assessment of the "digital competences" of employees working in a company where modules of digital technology can be found and are in demand. Employees expressed their individual opinions, but the other two groups of respondents expressed subjective opinions about employees from their place of employment. On this basis, it is possible to formulate conclusions regarding the level of qualifications and misalignment of the qualifications of people employed in manufacturing companies, as well as the conformity of the assessments formulated by the three groups of respondents.

The paper is laid out according to its purposes. First, the characteristics of Economy 4.0 in the field of work and production and enhancing skills in the context of the strategy Europe 2020 are presented. Then, the research methodology is described. The following parts present the evaluation of skills by employees, TU representatives, and managers in manufacturing companies in the Greater Poland region. The paper closes with conclusions. Literature on the subject, government documents and primary research data were used in the paper.

## 2. Economy 4.0's relevance to labor performance

The process of technological revolution is related to dimensions of information/communication technology and has been recognized as a significant driver of the modern economy. "Economy 4.0" has evolved in many directions in the whole economic system. It affects the production of goods and services, in both the private and public sectors. In

terms of impact, there are also structures and processes that shape the economic system. The technological revolution in the field of work and production systems, which are only part of the broad area of digitization's impact, has brought significant effects. As for the issue of human work, Levy and Murnane (2003) distinguish between manual and cognitive and routine and non-routine tasks, which are designed respectively to technology advancement. Using this classification, their study shows that automation initially replaced manual routine tasks, then manual, non-routine tasks and even cognitive routine and non-routine tasks as well; however, jobs spanning a wider range of different tasks and higher complexity are more resilient to the impact of advanced technology and robots. Modern machines like robots settled in production lines tend to complement part of these tasks and augment the performance of tasks that were not previously automated. Moreover, it tends to complement human tasks in sectors of production and services such as logistics, coordination and communication (Winfrey 2014). The goal is to increase productivity by automating the full value chain in manufacturing and by integrating autonomous robots and computers into a data network that globally connects companies, departments and functions (Chang and Hyunh 2016). Accordingly, as a result of production geographical diffusion increases the complexity of managers' and professionals' work. Nübler (2016) states that new occupations are created particularly at the intersection of professions, software and machines, calling them "hybrid" occupations based on different knowledge and experience, for example, lawyers, big data analysts or process analysts and extended reality.

The increasing power of Economy 4.0 and Industry 4.0 is influencing not only in-source jobs, but is also expected to disrupt value chains. Developing countries will lose comparative advantages in labor-intensive technologies despite low wages (Monnig, Maier, Zika 2019). For example, new robots can perform sewing tasks which have so far been the domain of low-wage countries. M. Billon, R. Marco. and F. Lera-Lopez (2009) based on cross-country wide research, conclude that emerging countries are expected to attract from developed countries jobs with more complex and advanced service tasks such as marketing, finance and R&D. Relatively weaker situation refers to emerging countries. Such countries are expected to progress in regional value chains, sub-contracting production to lower-income countries.

Since the elimination of jobs is in progress the political demand for the protection of jobs increases. Governments in many developed countries are implementing technology and industrial policies together with education and social programs (Majumdar, Banerji, Chakrabarti 2018).

The aim is to support R&D and invest in advanced manufacturing to bring back or save industrial jobs that could be or have been outsourced to low-income countries.

Economy 4.0 introduces vast changes to mechanisms on the job market, including the demand for particular qualifications, changes and the creation of new modes of work, often followed by companies adjusting their working conditions (Heeks 2010). Frey, Osborne and Jung argue that computing power and the potential of automation will eliminate almost half of the current jobs in the USA (Frey, Osborn 2013; Frey 2016; Jung 2019). Experience shows that phases of job loss were followed by phases of job creation, depending on the country's development status. However, this implies that the effects of new technologies on productivity and jobs triggered adjustment processes which created new jobs (Vandenberghe, Demmou, Frohde 2017). In result, the fundamental challenge is to bring about transformative changes in societies and economies in order to make the transition (Milošević, Dobrota, Rakočević, Barjaktarović 2018). This raises the important question of whether countries will be able to mobilize a societal learning process that will lead to new social and political choices, new social capabilities and the expected job creation.

### 3. The enhancement of digital skills included in EU documents

The smart growth policy in the European Union based on the implementation of innovation policy has been evolving for many years. That policy consisted of redefining goals, in particular for EU member states, and creating various instruments to implement various ventures or innovative projects. The main document which became the basis of assumptions for national programs for smart growth is *Europe 2020 strategy for smart, sustainable and inclusive growth* (European Commission 2010). Smart growth is understood in EU strategic documents as the development of an economy based on knowledge and innovation, growth creating high added value and requiring significant R&D outlays and mechanisms that are conducive to the effective application of theoretical knowledge in economic practice. Here the term smart growth is also used to describe the complexity of Economy 4.0. In the smart growth strategy, one of the goals was investment in all educational systems in order to increase their effectiveness and efficiency in raising the competences of the workforce, since it is impossible to create an economy

based on knowledge without an adequately educated society (Gomes 2019; Ivanović-Đukić et al. 2019).

In addition to the strategy document, the European Commission has prepared further studies to follow the situation regarding employee competences. In January 2018, the Commission presented the first package of measures on key competences, digital skills and inclusive education. The aim was to develop key competences of people of all ages and to better use the digital technologies needed in life and at work in the period of digital transformation (OECD 2019b).

In May 2018, the Commission presented the *Digital Europe* document for the creation of a “European education area” by 2025, which forms part of the 2021–2027 financial framework and stresses the importance of digital skills in teaching. The main task of the program is to achieve synergies, the source of which is the sum of advanced digital skills, artificial intelligence and large-scale calculations and their application in the economy and society. Ultimately, these activities will be conducive to building a thriving economy. Advanced digital skills are defined, in particular, as specialized skills in large-scale computing, artificial intelligence and cybersecurity at ISCED level 4 and higher (ISCED, 2011). One of the goals of the program is to ensure that the current and future workforce are able to easily acquire advanced digital skills by providing students, graduates and employees with the opportunity to acquire and develop digital skills wherever these people are (Mazur-Wierzbicka 2019; Kupets 2018).

The *Artificial Intelligence Strategy for Europe* has been operating in the EU since April 2018. This document emphasizes that no one should be left behind in terms of the digital transformation. Digitization is changing the nature of work; therefore, modernizing education at all levels is a priority. Tools for developing basic digital skills and skills that are complementary cannot be replaced by any machine. The most important are critical thinking, creativity and management. The European Commission also issued recommendations to member states regarding development of workers qualifications and preparing for a job market transformation. The task of member countries is to ensure a fair transition for workers to deploy AI through training programs throughout their working life, support for those affected by displacement and access to new opportunities in the job market (Harnessing Digital Transition for Sustainable 2019).

The EU documents contain many indications that suggest it is necessary to help workers in jobs that will be transformed or disappear due to automation, robotics and artificial intelligence. Workers and the self-

employed should be granted access to social protection, tailored education and training, certification and job-matching, and multi-stakeholder partnerships on e-skills should be established (Hüsing et al. 2014).

For digital technologies, it is necessary to understand the diversity of competences. Business skills and soft skills are as important as digital competences. The development of digital technology has meant that the division of competences has been redefined with the emphasis on digital competences. In this approach, there are discipline-specific and transferable skills. Discipline-specific skills include engineering, business and design skills, while transferable skills are comprised of problem-solving, soft skills, technological literacy, commercial knowledge and systems thinking (Universities of the Future 2019; Katidjan et al. 2018; Maliranta, et al. 2019; Zupancic 2018; Huđek et al. 2019; Hüsing et al. 2014).

In the Digital Economy and Society Index, Poland ranks 24<sup>th</sup> out of the 28 EU Member States, the same as in 2017 (DESI 2019). Full potential development is limited by institutional, legal and cultural barriers. Despite the existing potential of the IT industry, there is limited access to knowledge and the educational system trains closed, specialized groups. There is no emphasis on interdisciplinary and collaborative environments, soft skills or problem-solving using digital technologies. These barriers limit the scale of implementation in the economy and the creation of a strong digital technology system. In Poland, specialists are educated through online courses at foreign universities. This applies to highly qualified specialists developing technologies and using these technologies in business and administration, as well as to users whose work has changed significantly as a result of the development of digitization (Recommendations for the Strategy AI assumptions 2019).

Despite this, Poland has shown increasing efforts to secure a future supply of suitably qualified ICT practitioners and it is seen in transition phases between top-performing countries and countries with low activity levels. It is also indicated as a country which is a reservoir of talent (Hüsing et al. 2014).

#### 4. Survey method

The survey population was comprised entirely of employees who interact with digital solutions in their work in the manufacturing industry in the Greater Poland region *and* where their physical presence at work is required. The survey was addressed to one company in this region, whose name will remain anonymous and TU representatives of industrial

companies the Greater Poland (Wielkopolska). The questionnaire was distributed directly and separately to employees (workers) (30), company managers (10) who are employed in one company and TU representatives (13) who are employed in 29 different industrial companies and whose job includes one of the ten elements of digitization:

- 1) robots
- 2) 3D printers
- 3) augmented reality (VR)
- 4) Internet of Things
- 5) “big data” and data analysis
- 6) cloud solutions
- 7) computer simulations of processes
- 8) integration of manufacturing systems
- 9) cyber security
- 10) artificial intelligence/learning machines

The survey was conducted in the period from September 2019 to February 2020 and was comprised of three parts: (I) digitization in the workplace, (II) digital skills and training and (III) workplace and working conditions with eight, five and one question, respectively. The questions mostly were closed, but two in Section I and the one in Section III provided three multiple-choice answers. The respondents were qualified employees at the time, holding workers (64%), managerial (14%) and senior managerial (21%) positions. In the group of workers, the majority were people with five years of seniority or less (56%), while the others had from 6 to 10 years (25%) or from 11 to 20 years (18%); among the managers, 50% of the respondents had 11 years or more of service. Among the TU representatives, the reported seniority was 42% for five years or less, 16% for 6–10 years and 42% for 11 years or more. The surveyed employees were employed in the administration (67%) and production (25%) departments, while the remaining respondents worked in the management department.

The level and assessment of competences were measured by a set of questions related to the aim of the study and by the closed-ended and multiple-choice questions. The skills were identified through the survey based on the quantitative results of the respondents' answers and a respective comparison of the answers within the group of workers. That enabled their present skills, needed skills and skill misalignment to the requirements of Economy 4.0 to be diagnosed. The questionnaire consisted of two questions about the level of digitization in the workplace and skills (the answers ranged from 0 [production is not digitized at all] up to 5 [production is 100% digitized]) (OECD 2019c); nine questions

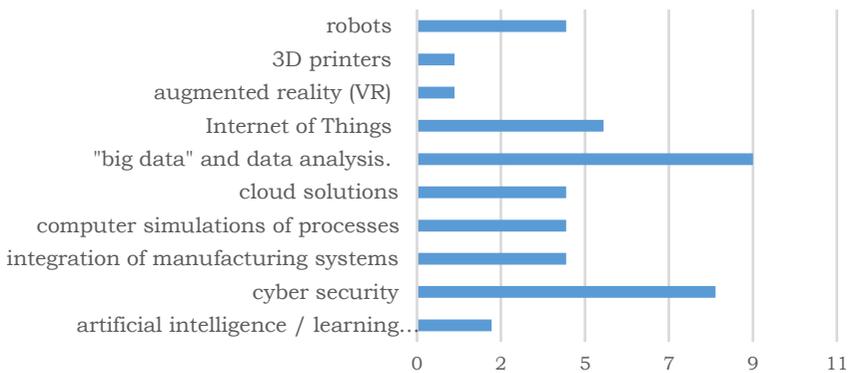
were about “digital” skills and their assessment in the context of the current and future requirements of the workplace (the answers ranged from 0 [not needed at all] up to 4 [vital]) (OECD 2019c). The respondents were also asked to answer a number of questions that were related to the characteristics of the work, such as employee training and “digital misalignment,” the intensity of employee training or an evaluation of its effects. The representatives from TUs and managers expressed opinions regarding about 5,855 employees, which is a representative sample at a 95% confidence interval and a 0.013 error rate, against the total number of 840,289 employees in the region (as of November 2019). TU representatives came from various companies and represented a total of 29 manufacturers.

## 5. The level and assessment of digital competences in the opinion of the surveyed employees, managers and TU representatives

The level of digitization was characterized at one of three levels of advancement: low, medium and high. Half of the employees (50%) assessed the degree of digitization of their workplace as high (“to a large extent” and “production is in 100% digitized”), while others considered it low (“to a small extent”). In the entire company, the surveyed TU representatives (54%) assessed the level as low, while managers (100%) said high, i.e. to the fullest extent. At a low level, the digitization of the workplace expressed by workers consisted of operating an ERP system equipped with big data technology. At the medium level, the respondents indicated robotic devices and workstations on production lines, simulated production processes, bots, cloud solutions, digital security and e-forms, while at the high level there were robots, digital controllers and integrated systems (see Chart 1).

According to the employees’ opinions, the level of digital competence was mostly medium (71%) and not high (3%) or low (0.7%). As many as 93% of respondents considered their level of competence to be sufficient, though they stated that in the future it would be necessary to raise their level of competence. Moreover, when asked about the chance for employment in the current job market, they considered their current level of digital competences, in the conditions of Economy 4.0, to be insufficient. These assessments among the employees proved to be partly consistent with the opinions of the TU representatives. More precisely, the latter stated that in every position (i.e. workers, managers and senior

managers) the level of competences was currently sufficient (60%), but would definitely need to be raised in the future, especially in managerial positions (67%). The managers expressed a critical assessment in this matter, and mostly agreed that the level of digital competence at company was average, while among workers it was very low (60%) and highest among senior managers. However, it will not meet the needs of the economy in the context of Economy 4.0 if it does not rise for all positions, especially the positions of managers and senior managers. We also found such an opinion regarding the future among the assessments of the TU representatives.



**Chart 1: Categories of workstation digital elements indicated by the surveyed employees**

Wykres 1: Rodzaje elementów cyfrowych stanowisk roboczych wskazane przez ankietowanych pracowników

Source: Author's own elaboration.

Most TU representatives and managers claimed that higher digital skills of employees would be necessary in individual departments, including management (33%) and logistics (22%). They stated that individuals should also increase their digital competences by working in departments of production and design. However, the role of digital competences for a company is still the most important in the design, assembly and administration departments. When it comes to the preferred education necessary to perform work, the majority of managers considered undergraduate education appropriate, while the TU representatives considered vocational education sufficient and workers stated slight advantage gained from master studies completed.

When assessing the importance of particular categories of digital competences, employees most often indicated language (60%) and

communication (60%); IT competences (50%) and teamwork (30%) came second. The TU representatives appreciated the need to develop employees' skills in team work, communication (66.7%) and management (50%) more, and IT competences (43%) less. Transferable competences were prevalent in these responses, while the specialized areas followed close behind. The managers highlighted the importance of specialist IT competences (100%) and all mentioned the above transferable competences to the same extent (100%), excluding managerial (90%).

In the respondents' opinion, claims about the risk of "digital maladjustment" prevailed (67% among workers, 66.7% among TU representatives and 90% among managers). In each group of respondents, half of them mentioned "age" and "position" as the source of this risk; nearly one in three respondents indicated "education level" (29%) as a risk factor. On the other hand, gender was mentioned less frequently (12.5%).

The survey results indicate that the training offered by the company is not completely satisfactory for employees. As many as 80% of the three groups of respondents expressed their dissatisfaction. The respondents admitted that the company does organize training, but there is a need to learn outside the company due to insufficient training hours. On the other hand, the company did little to improve the digital skills of employees. Training did not affect all positions, as confirmed by every other worker who expressed that training was most often addressed to managers and senior managers, and less often to lower positions. This would mean that the scale of these activities is not significant in view of the growing needs of workers, as evidenced by the assessments. In the opinion of the TU representatives, the training process is important for raising the level of competence and yields positive results; however, the training may be too brief (i.e., less than 20 hours) or at a low level of advancement. The vast majority of the three respondent groups (80%) agreed with the statement that the intensity of training would not increase in the near future, due to the lack of funds and the scarcity of attention paid to them by management. According to the managers and TU representatives, employers should encourage employees to train, because only in this way will they effectively raise the level of required digital skills and be able to achieve a high level of work productivity. The respondents in each group postulated the need to cooperate with public institutions as part of information campaigns and to promote employee education as well as various means of financial support in the form of tax relief and the possibility of obtaining funding. This is not surprising, because the use of training outside the place of employment encounters organizational and financial barriers.

The risk assessment of losing a job with the question, “Is digitization a threat to employment in your company department?” revealed that employees and managers were mostly convinced that the number of jobs in the digital age will definitely decrease (60% and 50%, respectively). In contrast, the TU representatives most often accepted the view that digitization would not lead to employment changes (62.5%); fewer people (25%) said it would cause growth. In this context, they added that in addition to the fact that digitization leads to automation, which in turn reduces the need for personnel or necessitates personnel changes, it improves the efficiency and reliability of processes and creates new jobs that require new competences; as a result, some manual work will be eliminated thanks to digitization. These job market problems can be solved by increasing training and reorienting professional qualifications. However, this requires effort on the part of the job market actors, as postulated by the European Commission (Industry 4.0 implications for higher education institutions, 2019).

Moreover, the workers, who were the only ones addressed by the question, “Do you take into account that due to insufficient digital skills, the company could transfer you to a different, worse position?” indicated that such changes would not occur (80%). However, there were some fears among them that wages may fall due to non-adjustment of digital competences (30%).

The study shows that the attitude towards the new work model is positive. The respondents are willing to accept changes in the working time chronometry and place of work. They stated that stationary work is no longer relevant and that the role of working remotely is growing. In connection with this view, they mostly supported the phenomenon of telework and work via digital platforms, although they see disadvantages of it, such as limited direct contact and the risk of social exclusion.

## 6. Competences and the status of workers

When talking about digital competences, we do not mean their current state, but what is conducive to or hinders the adaptation of competences to growing requirements, because the need to raise them is indicated by the decisions of businesses and the recommendations of the European Commission. It is also important whether in a thoughtful and coherent way companies formulate activities in the field of raising digital competences (Chetty et al. 2018). As one could assume, most of the TU representatives and managers believed that the level of digital compe-

tence of employees was at an average level. The employees themselves also thought the same, but there was a predominant desire to raise competences, thanks to which the effects of work and training can allow further digital technologies to be used (Kupets 2018; Bode 2018). These results are consistent with the DESI index, where Poland held 24<sup>th</sup> place in 2017 on digital competences (Europe's Digital Progress Report, 2019; Navarettiet al. 2019). The results of the study are also optimistic about employee attitudes towards training, which is also confirmed by an OECD report (OECD 2019c).

Among the most important motivations to undertake training, there is rarely a fear of changing jobs, losing jobs or changing salaries. This is positive in the sense of the company's labor resource management policy. All opinions also stressed the importance of the training activities carried out by the company. The role of digitization is appreciated, which serves to increase productivity, calculated as a decrease in failures, shorter production time and increased scale of production, but the importance of training that supports employees was also appreciated. In most opinions, unfortunately, there was a lack of training for lower positions or a clear orientation of them towards senior managers.

However, an increase of competences is needed in each department of an organization, especially in the workers positions, as managers noted. Moreover, adaptation to the requirements of digitization was rated as medium by each of the respondents; therefore, the problem is misalignment with job position.

The convergence of opinions of the three groups on the questions in the survey was not a rule. Although the respondents expressed a consistent opinion on the level of employee qualifications and indicated that improvement was needed, the opinions of the study groups were inconsistent regarding the categories of competences that should be raised. Of the two types of competences, transferable and specialized, employees and TU representatives express their support by putting in the first place transferable competences, while managers chose those of a specialized nature. Only the managers were in favor of specialized competences. Therefore, there was no agreement on the importance of specialized competences, which indicates that the awareness of their usefulness is not high enough among non-managerial positions.

However, agreement was found on the opinions regarding the intensity of training sessions and their referral to senior managers. All respondents said that they did not expect an increase in intensity or expenditures on training in the future. It is not a good sign for the future and requires action driven by public decision and partially externally supported.

A lack of appropriate digital skills can expose employees to occupational exclusion, which can have various causes, such as a lack of or difficult access to ICT training or low skills. According to the European Commission, almost half of the EU population does not have sufficient digital skills (Measuring the digital transformation, 2019). The results of this study are comparable to in this point and reflect the digital divide forecast in EU documents.

In the near future, most positions will require basic digital competences. The EU *Digital Europe Strategy* assumes the dissemination and increase of digital skills, learning ability and social integration; that in particular will cover all sectors of the economy and will become part of public-sector policy (Rozkut 2015; Deursen 2014; Grillitsch et al. 2017). Thus, in the studies presented above, it is surprising that little relevance was attributed to a bachelor's degree as a level of professional education.

However, it should be noted that the level of technology changes quite quickly and depends on the economic sector. This situation has been confirmed by a selection of studies indicating a lower level of digitization in the manufacturing sector than in the services sector (Europe's Digital Progress Report 2017; Dumitru 2016; Ghareeb et al. 2019). As shown by OECD (2019c, 2020) and Goos et al. (2014) studies in highly digitized industries, formal education at the post-graduate level is generally better suited, whereas in industries with less digitization, training on the job is more appropriate. Results show that employees are in an unfavorable situation, since they need training in the workplace and do not receive the appropriate number of hours, as stated in this study. Therefore, the demand for training that can help motivate employees and adapt their competences to the needs of the company is still high. The result is not fully compliant with mentioned studies, as workers have fears about their employment contract and expect that the number of jobs will decrease as digitization progresses.

## Summary

Continuous training is needed along with the emergence of further upgrades. Training for employees with very low digital competences also helps to strengthen their importance for the company (OECD 2019a: 173). Teaching programming, computational thinking, basic algorithms and logical thinking counteracts digital exclusion among adults. However, actions aimed at building the basis for digital competences among children are more important.

In light of the above research, it can be stated that the level of digital competences will have to be improved in the future, as indicated by the three groups of respondents. Accordingly, it is necessary to increase the availability of internal training in all positions, especially for workers. Identifying competency assessments on a small sample, which was based on subjective assessments formulated by the workers, trade union representatives and managers surveyed, would suggest that it seems expedient to undertake subsequent studies to analyze the factors that determine the assessment of the level of competence through control questions in this field. It is worth taking into account the fact that in Poland current deliberation on using public funds for business support services in the process of digitization influences company strategy in human resources and training and could accelerate demand for digital skills development. The study should not be considered as a representative issue, but may become a subject to one of the insights indicating the proper way to develop digital skills in all groups of workers. The existing digital skills gap in companies ought to be eliminated to expand their potential in Economy 4.0.

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## Rozwijanie umiejętności cyfrowych w gospodarce 4.0

### Streszczenie

Celem artykułu jest ocena kompetencji cyfrowych pracowników wykonujących stacjonarnie pracę z wykorzystaniem nowych technologii oraz wskazanie na poziom zgodności kompetencji z wymaganiami w świetle dokumentów UE. Artykuł zawiera analizę literatury, w tym przegląd dokumentów UE dotyczących wymagań kompetencji cyfrowych, oraz ich diagnozę przeprowadzoną na podstawie wyników badania ankietowego w dużym przedsiębiorstwie przemysłu motoryzacyjnego w Polsce. Osoby zatrudnione na okres pięciu lat lub mniej pozytywnie oceniały swoje kompetencje i śmiało patrzyły na stojące przed nimi wyzwania, wykazywały też wysoką motywację do uczenia się w przyszłości. Opinie wyrażane przez menedżerów i przedstawicieli związków zawodowych okazały się zbieżne. Wynika z nich, że zidentyfikowany stopień umiejętności cyfrowych pracowników może stanowić dla firmy i instytucji publicznych podstawę dla opracowania niezbędnych działań dla podniesienia ich poziomu.

**Słowa kluczowe:** kompetencje cyfrowe, pracodawcy, menedżerowie, digitalizacja, Polska