EMPLOYEES' DIGITAL COMPETENCY DEVELOPMENT IN THE CONSTRUCTION AND AUTOMOTIVE INDUSTRIAL SECTORS

Mazurchenko, A., Zelenka, M.

Anastasiia Mazurchenko / Technical University of Liberec, Faculty of Economics, Department of Business Administration and Management, Voroněžská 13, 460 01, Liberec 1, Czech Republic. Email: anastasiia.mazurchenko@tul.cz

Martin Zelenka / Technical University of Liberec, Faculty of Economics, Department of Informatics, Voroněžská 13, 460 01, Liberec 1, Czech Republic. Email: martin.zelenka@tul.cz

Abstract

Nowadays, many companies make a great deal of effort to take full advantage of digital transformation and stay ahead of their competitors. The influence of digitalisation on manpower development and human capabilities as well as on the business environment, in general, is especially noticeable in the construction and automotive sectors. That is why the main purpose of this paper is to evaluate the impact of new digital technologies on employee competency development in Czech construction and automotive companies. The quantitative methodology is based on primary data collection conducted from July through October 2020 using the CAWI method. As a result, 27 responses from Czech construction companies and 39 responses from Czech automotive companies have been gathered in Survio software, processed and analysed by using descriptive statistics and Pearson's chi-square test of independence. The qualitative data analysis applied in this paper includes three semi-structured interviews with human resource managers of selected Czech companies in the automotive industry. The advantages and disadvantages of the Covid-19 pandemic situation from the point of view of human resource management and employee training have also been analysed in the presented case study. The findings in this paper confirm that creating a digitally ready workforce and changing the employees' mindset towards the new style of doing their jobs remain significant challenges to deal with in the Czech construction and automotive industries.

Implications for Central European audience: This paper focuses primarily on the training and professional development of people employed in the construction and automotive sectors, which have been highly affected by the ongoing digitalisation of business and the current Covid-19 pandemic situation. As the results further demonstrate, the widespread use of digital technologies can definitely help to enhance employees' digital competencies. However, the employees still have to get used to a digitalised workplace. In such conditions, the role of human resource managers is key in the implementation of continuous training as part of the corporate culture.

Keywords: construction 4.0; technological innovations; employee training; digital skills development; automotive sector

JEL Classification: M53, J24, O14

Introduction

Currently, many research papers focus on the impact of digital transformation on the quality and productivity of production processes (Craveiro et al., 2019), the technical aspects of business development (Oesterreich & Teuteberg, 2016), the changing business model (Miqueo et al., 2020; Witschel et al., 2019), and the workforce and organisational structure (De Soto et al., 2019) in different industries. Therefore, *digital transformation* may be defined as a process of converting the main part of companies' business operations to online or otherwise computerised mediums, which often takes a long time and is not possible to finish fully because of the ongoing expansion of new digital technologies (Levit, 2018). It is important to point out that digital technologies require not only an understanding of their work but also changing employees' mindset for recognising and maximising the capabilities that digital technologies bring from the point of view of improving companies' competitiveness (Sen, 2020).

Recently, minor forms of digitalisation have also been accelerated by the Covid-19 pandemic with many companies switching to the home office, integrating corporate software into a complex IT system and starting to use new applications for communication with employees and customers such as Zoom, Webex, Teams etc. (AMSP ČR & Ipsos, 2020). In such an unexpected situation with a global nature, companies' digital readiness depends strongly on the level of their employees' digital literacy (Wheeler, 2019). However, the number of researchers that concern about the impact of advanced digital technologies on the employee training that is needed to thrive in this changing working environment is limited (Hernandez-de-Menendez et al., 2020).

Flexible skill acquisition and training are considered key challenges to employees in the automotive industry if they are to succeed in the new digital working environment (Plumanns et al., 2019). This is especially important because 13.8 million Europeans work in the automotive industry, accounting for 6.1% of all EU jobs and 11.4% of EU manufacturing jobs (ACEA, 2020). It should be mentioned that Czech Republic is among the top five EU countries with the highest share of direct automotive manufacturing jobs in total manufacturing employment, which is equal to 13.7% (ACEA, 2020). In view of the fact that 177,000 people are employed in the automotive industry, this sector is key for the Czech economy (Ortová, 2020).

According to the European Commission (Probst et al., 2018), more than one in three companies in the European construction sector has difficulties in finding human resources with the skills needed to exploit the benefits offered by digital technologies. This, in turn, reduces European construction companies' competitiveness, which provides 14.54 million jobs and covers 29.3% of industrial employment (Committee for European Construction Equipment, 2018). Moreover, the Czech construction companies have to deal with a continuing crucial shortage of qualified workers that is a crucial interest of the sector (European Commission, 2017). Despite the importance of the topic of skills shortage, the opportunities that might be used through the technologies' acceptance of human resource training and development in construction and the automotive sector have not yet been fully explored (Muñoz-La Rivera et al., 2021). In reaction to this, the research problem boils down to establishing the relationship between the frequency of the employees' improvement of

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digital skills and the industrial sector. For this purpose, the hypothesis has been set up and verified by the authors that there is no statistically significant relationship between the frequency of the employees' improvement of digital skills and the industrial sector to which the company belongs.

This paper aims to analyse the influence of emerging digital technologies on workforce training and employee competency development in the Czech construction and automotive industries by taking into account the impact of the Covid-19 pandemic. The brief literature review and analysis of the secondary data related to the topic are introduced in Chapters 1, 1.1 and 1.2. The research methodology, based on the primary data collection and interviews with a few human resources managers working in selected automotive companies in the Liberec region, can be found in Chapter 2. Chapter 3 is focused on processing the data obtained and interpreting the results achieved. More details about the case study of three Czech automotive companies in the context of digitalisation are described in Chapter 3.1. Finally, this is followed by a discussion and conclusion, including the limitations of this paper and directions for future research.

1 Construction sector and automotive industry in the context of digitalisation

The construction industry is undergoing a momentous change caused by the Fourth Industrial Revolution based on such underlying technology advances as cloud systems, simulation, adaptive robotics, virtualisation technologies, data analytics, artificial intelligence, communication and networks such as Industrial Internet, embedded systems and additive manufacturing (Ustundag & Cevikcan, 2018). Digitalisation may also be considered as one of the promising drivers for the creation of *Construction 4.0* through the implementation of an automated production system (Muñoz-La Rivera et al., 2021). Examples of continuous digital transformation in construction might be 3D scanning, Building Information Modelling (BIM) and the use of automated equipment or robotics (Probst et al., 2018). BIM may be defined as a digital form of construction that puts together process improvement, digital information and technologies for improved project outcomes and asset operations (Grosso Sategna et al., 2019). While the use of robotics has the potential to improve productivity and safety, it should not necessarily reduce total employment in the construction sector in the long run. It is expected that existing roles will evolve, and new roles will be created (De Soto et al., 2019).

Digital partnering might be one of the possible solutions for supporting the implementation of digital technologies in the construction industry, allowing companies to increase their employees' competencies and skills (Cheng & Li, 2004). As Aghimien et al. (2020) confirm in their research, the adoption of digital partnerships by companies is also directly associated with an increase in their competitive advantage. About 40% of the respondents agree that improved skills and expertise, as well as the impact of new digital technologies, are the most significant factors in maintaining a competitive advantage in the construction sector.

Osunsanmi et al. (2020), in their study of stakeholders' willingness to adopt Construction 4.0 technologies, have identified key areas and barriers for wider digitalisation and technology usage in the construction industry (see Table 1). Other studies in this area have been provided by the National Federation of Builders of Great Britain (2015) among 1,200 companies and by the UK's National Building Specification (2018) among 808 companies. Despite growing cooperation in the construction industry, the low level of employee training

and education (69% and 61%, respectively), as well as the lack of expertise and experience transfer (55% and 71%, respectively), remain among the main barriers to Building Information Modelling (BIM) adoption. Due to the lack of corresponding standards and legislation, the abilities of BIM are still not properly investigated in the Czech construction industry. According to Juszczyk et al. (2015), the low level of employees' digital skills and their lack of knowledge are the main barriers to successful BIM implementation in Czech construction companies. It is also worth noting that in Slovak construction companies BIM serves as an accelerator for employees' digital and managerial skill development (Mesároš et al., 2016).

Table 1 | Obstacles for Construction 4.0 adoption

The nature of the construction industry	The main barriers for Construction 4.0	Cost of Construction 4.0
Poor understanding of modern technologies	Difficulties in explaining the output from the technology to the client	High cost for data security
Failure of construction workers to embrace change	Low technical know-how	Cost of periodic employee training
Complex nature of construction projects	Construction firm low investment to research	High cost of maintaining the technologies
Site-based nature of construction projects	Reduced capability of improving employees' potential	High cost of construction workers' education

Source: authors' own elaboration based on Osunsanmi et al. (2020)

Industry 4.0 penetrates the automotive industry first by applying cyber-physical production systems and digital connectivity via the internet or other network applications, such as a blockchain (Cohen et al., 2019a). According to Hernandez-de-Menendez et al. (2020), machine learning (87%), user and entity big data analytics (84%), the Internet of Things (82%), cloud computing (76%), app- and web-enabled markets (76%) and autonomous transport (74%) are the digital technologies adopted most often in automotive companies. The need to interact with digital technologies to ensure uninterrupted production on a direct basis is related to the level of the employees' readiness for their effective use (Cohen et al., 2019b).

Generally, in the modern automotive sector, the need for knowledge in gathering, analysing and working with the large volumes of data being generated by machines and processes, especially due to the rapid development of electric vehicles, is growing. As a result, skills and knowledge connected with data networks, electrical engineering, software architecture, digital signal processing, artificial intelligence and robotics will be required from automotive engineering specialists (Pavlasek, 2020). Skills gaps, together with an absence of a clear understanding of the opportunities digital technologies provide (59%), are considered major obstacles for efficient technology use in the automotive sector (Hernandez-de-Menendez et al., 2020). Furthermore, the human resource strategy in German automotive companies focuses on vocational skills, while in Central and Eastern European companies, it is characterised by a much greater reliance on semi-skilled work, a higher share of precarious

employment relationships and employee turnover. It is influenced mainly by the role of the national institutions, trade unions and automotive companies in the implementation of digital technologies in separate European countries (Krzywdzinski, 2017).

While the automotive industry in Central Europe has experienced one of the most impressive growth and convergence stories of recent times (Kureková, 2018), its success is largely dependent on the current employees' competency development in response to the ongoing digitalisation accelerated by the Covid-19 pandemic. According to Soukupová et al. (2020), employees of Czech companies dread a possibility of a job loss or substitution of human work by robots because of the insufficient level of their skill required by Industry 4.0 The results of the literature also show that there is a dearth of rigorous studies that critically evaluate the skills gaps of people employed in the construction and automotive sectors. This paper aims to fill this gap by comparing the recent data about the employees' competency training and development in the Czech construction and automotive industry.

1.1 Digital employees' skills in construction and automotive companies: Secondary data analysis

The previous authors' research (Mazurchenko et al., 2020) emphasises a link between Industry 4.0 and the need for enhanced employee skills development, which is especially relevant for the construction sector considering that it is represented mainly by small and medium-sized enterprises (Aghimien et al., 2020). As the Committee for European Construction Equipment (2018) points out, supporting qualified employees' training together with identifying skill shortages in the construction sector must be the main priorities of the European Union political agenda. The right skills, such as effective data collection, communication and management, are considered a vital catalyst for construction companies' digital growth (Construction Industry Training Board, 2018).

The research conducted by Probst et al. (2018) demonstrates that 62.5% of the construction companies have the necessary skills to harness a digital transformation. However, only every third European construction company has already implemented strategies to reskill its workforce due to the ongoing digitalisation. In addition, each second respondent from the construction sector mentioned that they spend not more than 5% of their annual revenues on employee reskilling. It is predicted that 31% of the vacancies in European construction companies will be reserved for highly qualified candidates by 2025 (European Construction Sector Observatory, 2020). As a result, the gap between high-level and low-level jobs in this construction industry will become wider (Grosso Sategna et al., 2019). It should be emphasised that opinions about employees' skills and competencies that are needed in the construction sector in the context of the ongoing digital transformation may differ widely (see Table 2). Furthermore, traditional skills such as communicative and collaborative skills for effective teamwork are still in high demand (Construction Leadership Council, 2019).

Table 2 | Overview of the latest research in the area of employees' digital competencies required in the construction sector

Title	Authors, year	Employee competencies
Improving the human capital basis. Analytical report.	European Construction Sector Observatory (2020)	Technical skills, knowledge of lean methodologies and IT tools, accuracy, adaptability, effective communication
Digitalising the construction sector. Unlocking the potential of data with a value chain approach	Grosso Sategna et al. (2019)	ICT safety, digital data processing, digital content creation, problem solving with digital tools, digital communication and collaboration.
Future skills report	Construction Leadership Council (2019)	Digital skills, technical skills, collaborative skills, traditional skills
Unlocking construction's digital future: A skill plan for industry	Construction Industry Training Board (2018)	Problem solving, data skills, digital literacy, flexible mindset.
Digitisation of the construction industry: The revolution is underway	Oliver Wyman (2018a)	Smart training, efficient management of knowledge, enhanced focus on technology and innovation, reporting

Source: authors' own elaboration based on Oliver Wyman (2018a), Construction Industry Training Board, (2018), Construction Leadership Council (2019), Grosso Sategna et al. (2019) and European Construction Sector Observatory (2020).

At the same time, the demand for employees with software development and data collection and analysis skills will increase soon in the manufacturing industry (Freddi, 2018). Such changes are the most noticeable in the automotive sector, where it is predicted that the number of job positions that can be replaced by automation will decrease, and a need for employees with sufficient digital skills to fill such job positions as data analyst, process automation specialist software developer, artificial intelligence and learning specialist etc. will increase (Hernandez-de-Menendez et al., 2020).

Even though two out of three manufacturing companies have provided training to increase employees' digital competencies in the last 12 months, there is still a lack of digital skills within the workforce and the European labour market (Make UK & Sage, 2020). It is quite surprising that a need to provide cybersecurity and to change corporate management is not seen to be important for the further adoption of industrial digital technologies. However, the Covid-19 pandemic has become a driver for rethinking human resource training strategies (Make UK & Sage, 2020). Regarding the skills strongly required in the automotive sector, there are a lack of traditional science, technology, engineering and mathematics (SCEM) knowledge and engineering job profiles, which is why there is competition with other sectors possessing highly qualified staff (European Commission, 2017). As Kelp et al. (Oliver Wyman, 2018b) confirm, advanced analytical skills will be in great demand and finding employees with such skills might be difficult. In general, it is predicted that 16% of the global workforce in the automotive sector will need to be retrained and reskilled by 2030 to respond to the digital needs of their organisations (Knoedler et al., 2020).

2 Research methodology

This paper aims to analyse data obtained from Czech construction and automotive companies and demand for employees' competencies in response to the increasing usage of digital technologies in daily business operations. The authors have focused on looking at the answers to the research questions:

RQ1: What are the positive and negative effects of the Covid-19 pandemic on the digitalisation of human resource management and employee training in Czech construction and automotive companies?

RQ2: What are the main barriers to employees' digital competency development in the Czech construction and automotive sector?

RQ3: Which employees' skills are essential for the effective use of digital technologies at the workplace in Czech construction and automotive companies?

A review was conducted of scientific articles and conference papers available in the Web of Science and Scopus databases to gain insight into research on the topic of current employee competency development and skills gaps. The search was made using the following keywords: construction 4.0, human resources, employee training, digital manufacturing, automotive, technological change, digital literacy etc. After this, secondary information sources about the digitalisation of employee training in global construction and automotive companies were analysed (see Chapters 1 and 1.1).

For a more in-depth, valid and comprehensive study of the impact of digitalisation on human resource management with a focus on employee training in two selected industries, a triangulation method has been applied in this paper. Triangulation, by combining a qualitative and quantitative methodology, namely quantitative questionnaire survey, contextual interviews and the case study, was called to take into account different ways of understanding a research problem and help to compensate for the shortcomings of separate methods.

The collection of *quantitative data* was realised using a structured anonymous questionnaire that included 19 questions and used the CAWI method. Closed questions with one or more possible answers, scales that express the respondents' attitude to the researched issue, four identification questions to characterise the companies involved in the research, and one open question have been presented in the questionnaire. The 5-point Likert scale has been used to measure the respondents' attitude to how much they agree or disagree with particular statements by choosing one of the options between 'strongly agree', 'agree', 'neither agree nor disagree', 'disagree' and 'strongly disagree'. It has also been used to determine the frequency of employees' digital skills training. The semantic differential scales have been applied to ask the respondents to rate the level of their data skills and digital competencies by choosing between 'an expert', 'advanced level', 'basic level' and 'no level' of data skills or digital competencies. Another application of semantic differential scales in this questionnaire was the assessment of the level of employers' readiness to use digital technologies in the context of the Covid-2019 pandemic.

The database of the companies taking part in the qualitative survey was created based on the the data published in the MagnusWeb Bisnode database of all Czech economic entities on 1 June 2020 following the systematic procedure described in Table 3.

Table 3 | Process of Czech company database preparation

No. of step	N	Selection criteria
1	**7 821 363**	Legal and natural persons on 1 June 2020.
2	**840 581**	Active legal persons.
3	**580 318**	Active companies.
4	**194 966**	Companies with a specified number of employees.
5	**192 954**	Companies that are not in a state of bankruptcy or liquidation.
6	**156 181**	Companies without significant negative events in their history.
7	**93 910**	Companies with a specified email address and website.
8	**27 782**	Companies after the removal of businesses that do not have an email address on the corporate website or that have a non-functional website.

Source: authors

Consequently, 3,270 construction companies and 2,104 companies operating in the automotive industry (with CZ-NACE codes of the classification of the economic activities 29, 22, 28 and 25) have been selected. After this, the authors contacted all of them by email with a request to participate in an online survey. One hundred and seventy companies had a non-functional email address and were subsequently excluded from the representative sample.

The primary data was collected and processed by the online Survio software from July through October 2020. The gathering of the data was also supported by the District Chamber of Commerce in Liberec and the District Chamber of Commerce in Jablonec nad Nisou. As a result, data from 107 companies were obtained with a return rate of the questionnaire of 2%. Companies of all sizes from all regions of the Czech Republic are represented in the questionnaire survey.

At the final stage, questionnaires filled in by representatives of 27 construction and 39 automotive companies were selected. Most of the respondents from the construction sector (29.6%) who took part in this survey work in the marketing and sales department, whereas the respondents from the automotive industry are more often employed in the production and quality department (25.7%). The major regions in which the surveyed companies operate are the city of Prague (23.4%) and the Liberec region (25.2%). Regarding the size of the companies, the Czech construction sector in this paper is represented mainly by micro and small enterprises (81.5%) with fewer than 50 employees. The situation in the Czech automotive sector is the opposite in the sense that medium-sized and large enterprises (53.9%) with more than 250 employees have shown greater interest in participating in this survey.

The results obtained from the Czech construction and automotive companies were processed and analysed by using descriptive statistics to examine the frequency of responses and

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Pearson's chi-square test of independence aimed to determine the relationship between two unpaired categorical variables. This statistical test was based on the assumption that the null hypothesis (H0) does not confirm the existence of differences between the observed and expected frequencies (i.e. that the variables will be independent). Before being processed in Microsoft Excel 2016, the data has been transformed in such a way, so less than 10% in the pivot table had a value less than 5, thereby fulfilling the prerequisites for doing Pearson's chi-square test of independence. The results of the quantitative data analysis are presented in Chapter 3.

A qualitative methodology in this research was adopted to understand the phenomenon of digitalisation in business practice based on three semi-structured interviews conducted with human resources professionals in three automotive companies from October through December 2020. These companies have been chosen in the Liberec region based on the cooperation with the District Chamber of Commerce in Jablonec nad Nisou and its recommendations. The relevance of the topic of digitalisation and active involvement in the employees' competency development in reaction to it was the main selection criteria of these companies. Contextual interviews were aimed to complement the findings in quantitative survey results and shed light on how automotive companies in the Liberec region cope with the need to rapidly embrace digital technologies supporting their staff to learn and work remotely during the Covid-19 pandemic. The automotive sector's attention was focused on understanding how employees are using technologies and what support is required for developing their digital competencies. These circumstances, and also the need to restrict face-to-face contacts in response to the ongoing Covid-19 pandemic, had a significant impact on the companies' interest to cooperate. As a result, the number of interviews conducted was limited to three.

A semi-structured interview has been chosen to ensure more flexibility and freedom for respondents to express their views than in the case of a structured interview and more organisation and systematicity than in the case of an unstructured interview. Based on the results of the literature review and secondary data analysis (see Chapters 1 and 1.1), 16 open questions have been prepared divided into four research areas such as:

- requirements for the employees' competencies in a company in general;
- digitalisation in human resource management of a company;
- employees' digital competency development and investments needed for this;
- the impact of the Covid-19 pandemic on the company's digitalisation and innovation.

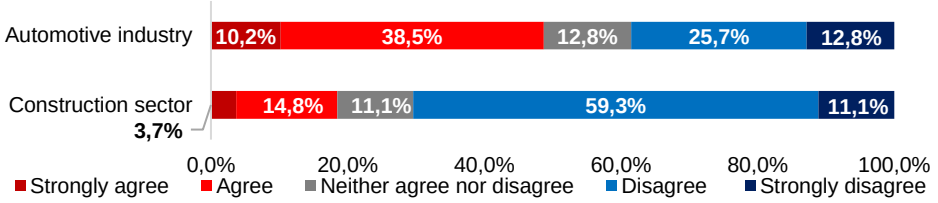
The duration of the one interview was 45 minutes. The respondents' answers with their verbal consent were recorded with a voice recorder. Subsequently, the responses obtained have been converted to text format word for word in MS Word editor and translated from Czech into English by the authors. When transcribing data, the technique of anonymising data was used, which serves to protect the names of the respondents and the companies they represented. Next, a manual (i.e., paper-and-pencil) coding and analysing method have been used. Finally, the data obtained were sorted, compared with each other in order to find a connection between them and interpreted by the authors. Based on the results obtained, the context of the topic of digitalisation and employees' competency development was described in more detail presented in the form of a case study. The case study is introduced in Chapter 3.1.

3 Digitalisation in the construction and automotive sectors: Primary data and research results

The performed CAWI survey highlights the fact that using digital technologies in day-to-day business operations is becoming common in both Czech construction and automotive companies (82.5% and 89.7%, respectively). A relatively small percentage of the respondents, namely 14.8% from the construction industry and 10.3% from the automotive sector, confirm that they utilise digital technologies from time to time, and no one mentioned that they are not used at all in their companies' business practice.

As Figure 1 shows, respondents' opinions that some work and tasks will become unnecessary because of the utilisation of digital technologies are divided significantly. From this view, around one-half of the respondents (48.7%) agree that such a statement is appropriate to the Czech automotive industry. However, it does not seem that digital technologies will contribute to the fact that certain works and tasks will no longer be needed in the daily work of Czech construction companies (70.4%).

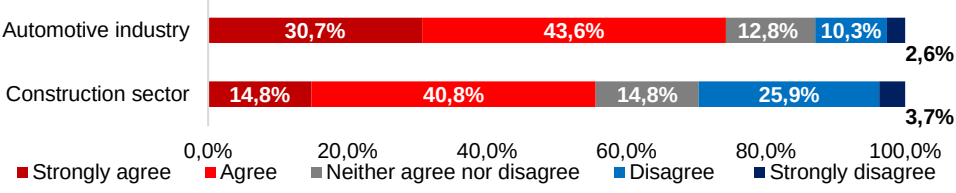
Figure 1 | Respondents' attitude to the assumption that some tasks will become unnecessary in selected industries due to the utilisation of digital technologies



Source: authors

It is worth noting that the topic of employee competence development is more often a part of a long-term human resource management strategy in automotive enterprises than in construction companies (66.6% vs 37.0%). It is also visible in Figure 2, where approximately one-third of the respondents in the Czech construction sector (29.6%) do not see the need for additional employee training for the effective utilisation of digital technologies in their daily work.

Figure 2 | Respondents' attitude to the assumption that digital technology use increases the need for employee training in selected industries



Source: authors

The respondents in this survey have also been asked about their companies' readiness to use digital technologies in the context of the Covid-19 pandemic. The results are presented in Figure 3. It is no surprise that most of the construction and automotive companies have

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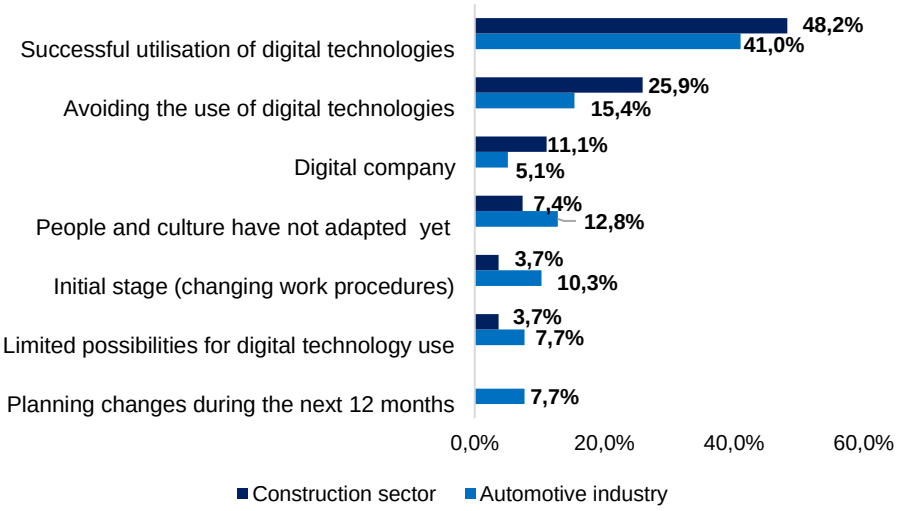
already successfully implemented digital technologies in selected business processes and that they are continuing in this direction (48.2% and 41.0%, respectively). Nevertheless, it was unexpected that every fourth construction company rather avoids utilising digital technologies, and none of them intends to implement changes over the next year. This may be due to the fact that every tenth construction company is already working in the cloud, collaborates effectively online and has all its business processes digitally enabled. As for the automotive industry, the main obstacle to digital technology adoption is that these technologies are not a part of corporate culture, and the employees' mindset is not adapted to them yet (12.8%).

Figure 3 | readiness to use digital technologies in the context of the Covid-19 pandemic



Source: authors

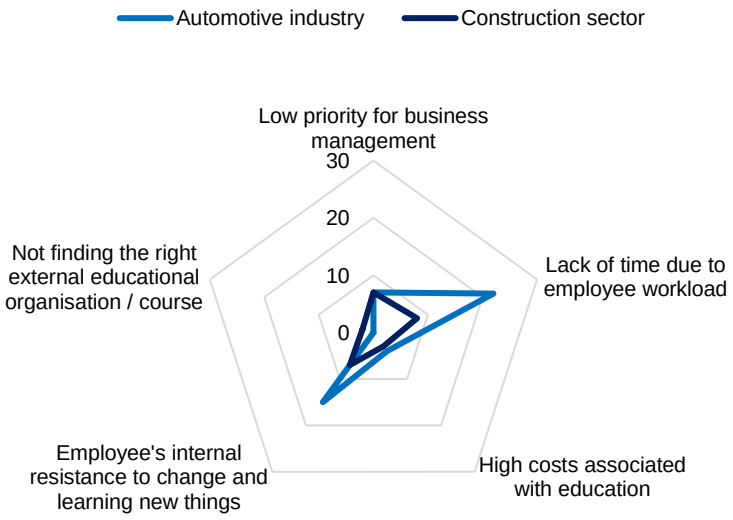
The majority of the automotive companies that took part in this survey (51.3%) take regular steps to improve their employees' competencies to perform tasks related to the use of digital technologies, whereas only 37% of the construction enterprises do the same. Training provided by the employer is the most commonly used for this purpose in both the construction and automotive sectors (60.0% and 69.2%, respectively). Meanwhile, training through informal assistance from colleagues and friends is in greater demand in Czech construction firms than in automotive companies (30.0% vs 23.1%).

Regarding the level of employees' digital competencies, these are estimated as basic among 71.8% of automotive companies' personnel and 63% of the construction companies' employees. Almost one in four employees in the automotive sector (23.0%) has a low level of digital competency, while this figure is significantly lower in the construction sector (14.8%). Only a small proportion of the employees in both sectors can be distinguished by an advanced level of digital competency (2.6% vs 11.1%). At the same time, 7.4% of the people employed in the construction sector do not have any digital competence at all. Furthermore, both sectors' representatives agree on which employees' digital competencies are a priority for further successful company development. These include basic skills in data entry and processing, database management skills, the ability to solve problems in a digital

environment and digital project management skills. At the same time, website development skills are not considered essential in the construction industry. Only 5.1% of Czech automobile companies' employees may boast an advanced level of data skills, while in the construction sector, this number reaches 14.8%. This is especially important because data skills are key for companies' continued operation in both sectors.

Figure 4 shows the main barriers to employees' digital competency development. The high costs associated with employee training and an inability to find an appropriate external educational organisation or course are not deemed to be significant. The same goes for the low priority of the companies' management in both sectors surveyed. However, lack of time due to the employee workload, employees' internal resistance to change and reluctance to learn new things slow the digital competency development of people employed in the automotive sector, in comparison with the construction sector.

Figure 4 | Main barriers to employees' digital competency development



Source: authors

There is a demand for updating employees' skills, and the frequency of employee training is significantly different in the Czech automotive and construction sectors to ensure efficient performance in a digital environment (see Figure 5). Every third construction company does not see the need to update employees' skills at all, whereas every fourth automotive enterprise considers that completing the training on digital skills improvement once every few years will be enough. Despite this fact, the Czech construction sector is more aware than the automotive industry of the need to support the ongoing training of employees in the digital age (18.5% vs 12.8%).

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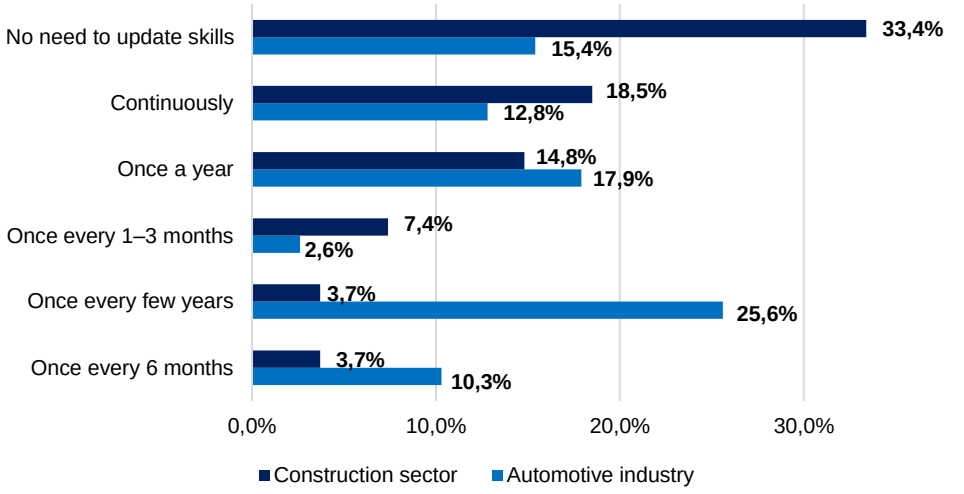
Figure 5 | Frequency of employees' digital skills training



Source: authors

The difference between two Czech industrial sectors (i.e. automotive and construction) in the case of the frequency of their employees' improvement of digital skills has also been verified by the authors using Pearson's chi-square test of independence. The next research hypotheses have been set up:

H0: The frequency of the employees' improvement of digital skills does not depend on the industrial sector.

H1: There is a statistically significant relationship between the frequency of the employees' improvement of digital skills and the industrial sector.

If the respondent did not know the answer to this question, his or her response was excluded from the dataset in Microsoft Excel 2016 (see Table 4). Next, a hypothetical distribution was calculated based on the whole population, and the p-value has been identified by using the function CHISQ.TEST. Due to the fact that a p-value equal to 0.028811 is lower than a selected 5% level of significance, there is a statistically significant relationship between the frequency of the employees' improvement of digital skills and the industrial sector.

Table 4 | Pearson's chi-square test of independence: comparison of the observed and expected frequencies

Frequency of the employees' improvement of digital skills	Once every three months	Six months to several years	Never	Total
Automotive sector	6 (18%)	21 (64%)	6 (18%)	**33 (100%)**
Construction sector	7 (32%)	6 (27%)	9 (41%)	**22 (100%)**
Total	**13 (24%)**	**27 (49%)**	**15 (27%)**	**55 (100%)**
Pearson's chi-square distributions				
Automotive sector	7.8	16.2	9	**33**
Construction sector	5.2	10,8	6	**22**
Total	**13**	**27**	**15**	**55**

Source: authors

According to one-half of the respondents in both sectors, internal training of the existing employees is the most popular measure to close gaps in employees' digital competencies. For this purpose, every fifth company also plans to recruit new employees who already have the required digital competencies. It should be mentioned that hiring temporary staff through agencies is not in demand. Moreover, external training of existing employees in the area of digital competencies is applied in the automotive industry three times more often than in construction (27.3% vs 9.1%), while the outsourcing of digital tasks is used far more often by construction companies (13.6% vs 2.3%).

The respondents in both sectors were also asked to specify the areas in their work where they feel the need to improve the level of their digital competencies. The results have shown that data entry, processing and analytics (15.2%), data storage and security (9.5%), online communication with employees and customers (8.5%) and the ability to solve problems arising from the use of digital technologies use (6.6%) are among the key areas for further improvement. Meanwhile, 8.5% of the respondents believe that they can work with what they know and do not feel a need to improve the level of their digital competencies.

3.1 Digitalisation in the automotive sector: A case study of three Czech automotive companies

To support the results obtained during the primary data collection, the authors of this paper conducted three in-depth semi-structured interviews with human resources specialists in Czech automotive companies operating in the Liberec region. To ensure anonymity, the companies mentioned in this chapter are called Company 1, Company 2 and Company 3. The general characteristics of the interviewed companies, including specific details about human resource management (HRM) in the context of digitalisation in these companies, are presented in Table 5.

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Table 5 | Comparison of the selected characteristics of the interviewed companies

Classification criteria	Company 1	Company 2	Company 3
Type of company	Private limited company (family business)	Private limited company (a part of a German concern, 8 branches in the CR)	Private limited company (8 branches in the CR)
Date of founding	1994	2002	1992
CZ-NACE Code	25, 27400, 32130	29320, 25, 33, 45200	27120, 25, 28290, 33
Company size	Small enterprise (42 employees)	Large enterprise (1,000 employees)	Large enterprise (3,500 employees)
Human resources department	None (the executive director is also the financial and personnel director)	18 employees also responsible for safety at work, ergonomics (health centre, legal consultancy)	1 human resources manager in a regional department with 400 employees
Digital technologies used in human resource management	VEMA, Microsoft Word	New internal human resource informational system, LinkedIn	SAP, Microsoft Office, digital signature and payroll checks
Digital tools for corporate communication	Gmail, WhatsApp, Skype, internal production and trade management system	Microsoft Teams, Zoom, Gmail, Skype	Communication via smartphones (getting feedback, surveys, messages, etc.)
Required employee competencies	Technical knowledge, language skills, social media skills, readiness to learn something new	Digital competencies, creativity, project management skills, teamwork in a digital environment, innovativeness	Technological readiness, data analytics, effective decision making, communication in a foreign language
Employee training	Languages, Word software use through external agencies and suppliers	E-learning platform from DATRON (videos, animation)	Work in SAP, database management

Source: authors

Company 1 is a family business that started 26 years ago in the jewellery industry and, over time, started to take orders from other industries as well, such as manufacturing pressed metal parts for the automotive, electrical and consumer industries. When it comes to the digitalisation of manual professions and business management, everyone uses digital technologies. Thus, technical preparation of production, design, offer and order preparation up to invoicing is a complex digital system in which each employee can gain access to a specific order using an individual barcode. This company used to have more separate

systems, and the Covid-19 pandemic has helped immensely with faster integration. There was also no need to utilise new software for corporate communication or to buy new equipment for the home office. Nevertheless, there is the challenge of how to keep employee engagement at the home office at the same level.

Because Company 1 is stable and has a good reputation, fluctuation is equal to zero. Recruiting highly qualified people is not a challenge for Company 1, even during the Covid-19 pandemic. However, the number of people in the Czech Republic who anticipate manual work has decreased. Potential employees are expected to be able to communicate in foreign languages such as English, Italian, German or Russian, and work in the software used by the company. At present, Company 1 does not plan to introduce new systems or tools in human resources management because such investments would be too expensive and would not justify themselves in such a small company. The purpose for the future is to link the new company web page with such social networks as Facebook and Instagram and with a new, comprehensive internal production and trade management system. Company 1 has made huge progress in digitalisation, stabilisation of the work team, remote management and digital communication over the last five years and does not expect significant development of the employees' digital competencies soon. Other important changes in this direction might come in connection with robotisation, which should be efficient and redeemable.

Company 2, as a part of global German concern, specialises in the development and production of brake systems for the automotive industry. One of this company's ambitions for the future is to fully digitalise recruitment with the help of Shared Services Centre using a new internal human resource information system that connects all branches around the world within the concern. Employees are very important for Company 2. That is why a new competency model was implemented this year with digital competencies included in it. Company 2 plans to invest 30% of its budget in its employees' digital competencies development next year and believes that over the next five years, its budget will be rather saved than spend. This will be more efficient and cost less than training employees in other specialisations.

The Covid-19 pandemic has had positive and negative effects on human resource management in Company 2. On the one hand, in the beginning, the IT competencies of some employees were insufficient, and the level of employee engagement and motivation was rather low. The percentage of people at the home office has increased greatly, and the network capacity was insufficient. On the other hand, Company 2 has made great progress in the online world, and the use of the corporate e-learning platform is already at the professional level. The need to share information and create virtual groups led to the utilisation of Microsoft Teams far more often than had been the case earlier and did not require additional investments. Even though adaptability and the ability for continuous learning are characteristic of both employees and the senior management, Company 2 is curious about the future of online learning and what the new style of work in the context of the ongoing digitalisation will look like.

The regional department of Company 3 in the Liberec region has dealt with the production, development and trade of electrical installation materials since 1992. The functions of the human resource department are shared so that all the personnel administration of all eight Czech branches is done in Poland, and payroll accounting is done in Brno. Six months ago, the regional department started to digitalise human resource documents, but this process is

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limited by Czech legislation, which is slightly behind Industry 4.0. For example, an employment contract still cannot be signed digitally. Moreover, the use of digital signatures and data boxes by all employees does not make sense from a financial and procedural point of view. For this reason, it will not be possible to set up paperless human resource administration in Company 3 soon. The Covid-19 pandemic has shown that the biggest challenge for Company 3 is not to prepare laptops for the home office or to provide remote access but to change senior managers' thinking in a new working environment. Human resource (HR) managers are not expected to have such digital competencies as programming, and employees' digital competencies are not crucial to the technical positions. Therefore, due to the Covid-19 pandemic, the need for digitalisation has increased quite significantly both in the area of human resource communication with employees and with senior management.

Findings from this chapter have shown that despite the size of the company, many processes and operations may be simplified and expedited with digitalisation not only in the field of planning production and relationships with customers but also in human resource and employee training and development. Promoting a corporate culture that accepts changes and management coaching is important to get the most out of digitalisation. In such conditions, employee training support is becoming a necessary part of the overall corporate strategy.

Discussion and Conclusion

The findings from this paper confirm human resource management and employee training in Czech construction and automotive companies have been significantly affected by that the Covid-19 pandemic. The digitalisation process was considerably accelerated, and the transition of most employees to the home office has led to the need to improve the level of their digital competencies, which is an advantage. Most of the companies in the Czech construction and automotive industry are successful in digital technologies implementation in separate business processes, and they do not plan to stop this process. It is disadvantageous that, as a result of the pandemic, the employees' workload is increasing. At the initial stage of the use of new digital technologies, the employees' internal resistance to change is often becoming a barrier to speeding the development of their digital competencies. It also should be mentioned that such skills as data processing, security and analytics, problem-solving in a digital environment and effective online communication are in great demand.

There is no doubt that companies' digital readiness and competitiveness require training in digital technology use across the workforce, and the human resource department plays an important role in this process (Wheeler, 2019). Companies' digital readiness can be identified as the level to which companies can accomplish and take advantage of the full benefits that the Fourth Industrial Revolution digital technologies propose (Hernandez-de-Menedez et al., 2020). Balsmeier and Woerter (2019), in their research on the influence of digitalisation on job creation and destruction, emphasise that investment in digital technologies has a positive association with the employment of highly skilled workers. Prokhin (2020) maintains attention to the fact that utilising digital technologies in daily business practice leads not only change the companies' competitive position but also transforms the structure of industrial enterprises and their production processes. Successful digitalisation results in a positive, long-term net benefit for companies (Haevin & Power, 2018). At the same time, it is expected that digital transformation will require additional investments in employees' skills that cannot be replaced by robots and will continue to be used in construction (Prokhin, 2020). Furthermore, the high

demand for human resources in the automotive sector creates a significant obstacle to companies in this industry dealing with digital transformation, which is especially important in the case of small and medium-sized enterprises forced to invest heavily in digital transformation trends (Llopis-Albert et al., 2021).

According to the data from the project DataSkills4SMEs (DataSkills4SMEs, 2020), gathered mainly in Italy, Germany and Austria in 2020, the costs of external educational agencies' services (approximately 50%) and lack of time due to employee workload (approximately 45%) are among the main obstacles to the workforce's digital competency development. The study includes 338 participants who represent primarily micro and small enterprises (69%) from the services and manufacturing sector. Search engine optimisation, customer relationship management, cloud services, enterprise resource planning system and social media are evaluated as the key areas in which there is a need to increase employees' digital competencies. Self-assessment of digital competencies demonstrates that approximately 40% of the respondents have them at an intermediate level, and only less than 10% of the participants evaluate their level as either excellent or very bad.

However, it is worth noting that self-assessment might not be an efficient tool for measuring the level of digital competencies. A study conducted by ECDL Foundation (2016) states that people tend to overestimate their level of digital literacy. The survey results demonstrate a significant difference between participants' self-evaluation and practical evaluation of the general digital skills level in Austria (94% vs 39%). The same situation is found in Switzerland, where the actual level of the skills needed for using the internet and email is much lower than that indicated by the survey respondents (85% vs 34%).

Another study conducted by Harvey Nash and KPMG CIO (2018a, 2018b) confirms that companies in the construction and engineering industry understand the impact of digitalisation on their work better than manufacturing and automotive sector companies (49% vs 33%). It should also be noted that all industries have difficulties with recruiting and training people with digital skills (24%), but this is less relevant for the construction and engineering sector than for the manufacturing and automotive industry (13% vs 16%).

A survey by Abel-Koch et al. (2019) examines the role of ongoing digital transformation in five European countries. At least 30% and at most 70% of the companies interviewed are SMEs running a business in the construction and manufacturing sectors. Even though every third German SME perceives digitalisation as a top priority, according to their own estimation, it is not one of their competitive strengths. Moreover, the shortage of employees' digital skills both within German SMEs and on the external labour market remains an important bridge to cross. In fact, software development skills (38%), digital strategy (33%) and database management skills (30%) are lacking the most among the German workforce. Competitive pressure is also one of the main drivers for new technology adoption in Polish SMEs. In that case, recruiting new staff (52%), offering external employee training (47%) and outsourcing tasks to external contractors (43%) are the steps taken most often to fill the digital skills gaps by Polish SMEs.

The study conducted by the authors of this paper is a valuable addition to the previous research presented above because it presents up-to-date information about the employees' digital competency development in the Czech construction and automotive companies in the context of the Covid-19 pandemic. Nevertheless, this study has its limitations in the three

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main domains. First, the sample size is rather small (e.g. 66 companies from the construction and automotive industries), and the response rate of the questionnaire is low (e.g. 2%). Second, the authors' survey covers only companies that conduct entrepreneurial activity in the Czech Republic, which does not allow generalising the results obtained. Third, the authors concentrate on changes caused by digitalisation and partially by the Covid-19 pandemic in the field of employee competency development only in the construction and automotive industries. Taking into account all of these limitations, the next possible direction for future research might be aimed at evaluating the influence of digitalisation on employees' learning and development in construction and automotive industries in other Central European countries and comparing the data obtained with those gathered in the Czech Republic.

Undoubtedly, the rise of new digital technologies accelerated by the Covid-19 pandemic provides construction and automotive companies with revolutionary opportunities to improve their style of employee training and change the way they work not only in the Czech Republic but also across Central European countries. This is particularly important considering that employees' digital literacy is a fundamental factor in companies' future success in a rapidly changing business environment (Wheeler, 2019). The results presented in this paper confirm that there is a statistically significant relationship between the frequency of the employees' improvement of digital skills and the industrial sector. According to the primary data obtained by the authors, the vast majority of employees in the Czech automotive and construction industries (71.8% and 63%, respectively) have only a basic level of digital skills. The typical barriers for increasing employees' digital readiness include the employees' reluctance to learn new technologies and a lack of time due to their workload. Moreover, the results of the authors' research presented in this paper demonstrate that all core business processes are digitally enabled only in a relatively small amount of the Czech automotive and construction companies (5.1% and 11.1%, respectively). Therefore, resolving gaps in employees' skillsets connected with data security, processing and analytics and problem-solving in the digital environment requires the senior managers' readiness to apply new change management styles, cultural shifts and technologies to successful digital transformation in construction and automotive industries.

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