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The Impact of COVID-19 on the Readiness of Enterprises for Employee Training Using ICT – A Comparison of the Visegrad Four Countries Covid-19

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Abstract

This paper examines the impact of the COVID-19 pandemic on the readiness of enterprises for employee training using ICT. It first examines Eurostat's secondary data, mainly comparing 2019 and 2022 for medium-sized enterprises (50-249 employees, all sectors excluding the financial sector) from the Visegrad four countries. It then examines two specific Digital Economy and Society Index (DESI) indicators: Human Capital and Integration of Digital Technology. The paper concludes with an analysis of these indicators using the Kruskal-Wallis test to confirm or reject the assumed positive relationship between the indicators, and data about enterprises that provide training in order to develop the ICT skills of their employees. Data on ICT usage in enterprises were collected from Eurostat. Data on the Digital Economy and Society Index were collected for comparative analysis. COVID-19 was found to have had no significant effect on enterprise readiness for employee training with ICT. The results also suggest no positive relationship between ICT employee training and indicators from the DESI index. Learning and development practitioners should take greater account of changing and unpredictable realities, as well as the evolving nature of information and communication technology (ICT). The COVID-19 pandemic may yet help to modernise existing development offerings in organisations and foster a culture of lifelong learning.

***Keywords*:** information and communication technology, employee training, DESI index, digital skills, COVID-19, pandemic

1. Introduction

The rhythm of change, the unpredictability, uncertainty and ambiguity of events, and the increased development of modern technologies are dynamically shaping the work environment and influencing the trends and methods used in employee training.

Expectations are changing, forms of development are evolving, and the need for new tools and training is emerging (Williams, 2020). In addition, employees have for some time been

expected to take greater responsibility for improving existing skills and adding new ones to meet current job requirements, prepare for leadership opportunities, and secure their employability to transfer and adapt within and between organisations as needed (Molloy & Noe, 2010). Moreover, the recruitment of employees belonging to the millennial generation born in the 1980s-2000s - the generation that is technologically literate, determined to succeed quickly and expects quick satisfaction poses new challenges for employers (Pyöriä et al., 2017). In recent years, this challenging situation has been exacerbated by COVID-19 – which has had an unprecedented impact on the labour market – and employee development in companies is a topic more important than ever today. The need for social isolation as a result of the pandemic has permanently stigmatized the training market. It was necessary to move the development landscape from physical training spaces and face-to-face contact to the online environment (LinkedIn Training Report, 2020).

Originally known as the coronavirus, COVID-19 has become a worldwide pandemic (Bayuni, 2020). This situation has created a challenging context for organisations, and particularly the human resource management function. New technologies are proving to be crucial in the fight against the crisis, enabling communication and remote working or online learning on an unprecedented scale. A key advantage of integrating collaborative technologies into the learning environment is that users can have constant access to learning materials (on-demand) from anywhere using various devices (Fake & Dabbagh, 2020). At the national level, human resource development policies and human resource training programs are becoming a catalyst for workforce productivity growth, especially in the Industrial Revolution 4.0, which requires advanced technological knowledge (Man, 2020).

The crisis has also forced people to confront several unresolved issues related to the extent of technological intrusion into professional and private life. Deep transformations in many areas of life are not yet over – they are in process. This also includes human resources in companies. This pandemic has redefined the field of learning and development in organisations (Jingfang & Yates, 2020; Kshirsagar et al., 2020; Raheja, 2021; McRae & Aykens, 2022; Training Magazine, 2019; Training Magazine, 2022).

This paper aims to investigate the impact of COVID-19 on companies' readiness to implement employee training using information and communication technology (ICT) within the Visegrad Four countries, i.e., the Czech Republic, Poland, Hungary and Slovakia. Thus, the research question is whether COVID-19 had a positive impact on these companies' readiness to implement employee training using information and communication technology.

2. Theoretical Background

2.1. Employee Training

Human capital is perceived nowadays as a high-value and in-demand asset which, if properly applied, can stimulate the growth of a company's market value and, in the long term, appears to be much more important than the ownership and use of material resources and financial capital (Nadiv et al., 2017; Somogyi, 2020). Current corporate practice confirms that employees' capabilities, knowledge and skills are becoming key determinants of competitive advantage in global markets, as pointed out by Hammond & Churchill (2018). Organisations consider human resources as a "second source of profit" and have elevated human resource development to a strategic level, and nowadays, training and human resource development have become

important prerequisites for enterprise development (Halbouni et al., 2016). Furthermore, training can serve to increase individual and organisational productivity, one of the main objectives of human resources management (Ozkeser, 2019).

According to Hanaysha (2016), employee training occurs when an individual acquires and develops new skills, knowledge, abilities and attitudes. It is goal-oriented, influences cognition and behaviour and is based on experience. Thanks to Industry 4.0 and its digitalisation, educational content is becoming more accessible to employees and new opportunities are opening up (Saniuk et al., 2021). Digital skills are increasingly being mentioned, particularly in the context of the growing need for skilled workers in the labour market.

2.2. COVID-19 and Information and Communication Technologies

The biggest challenge today is the COVID-19 pandemic and the resulting global economic crisis, dramatically changing people's communication habits through information and communication technologies (Guillermo et al., 2020). While there is no single universal definition of ICT, it generally refers to all devices, network components, applications and systems that together enable people and organisations to communicate in the digital world (Heeks, 2018).

The use of ICTs has become the standard everywhere: at work, in learning and in everyday transactions. In addition, it has particularly far-reaching consequences for workers, as it has most likely accelerated the process of job transformation (Guillermo et al., 2020). The coronavirus pandemic has forced businesses to embrace digital transformation and change how they create, provide and capture value for their customers (Lugtu, 2021). In addition, enterprises face another challenge: the management of big data. If it becomes the starting point of a real industrial revolution based on converging technologies and businesses fail to master it, their competitive position will weaken (European Parliament, 2023).

For their part, to use digital technologies in different situations and for different purposes, employees will need to acquire the relevant competencies: new knowledge and skills that will become an important part of the development and competitiveness of individuals and companies. As the digital transformation processes deepen, the most important issue is an appropriate, flexible education system that enables the development of competencies and new skills. These aspects are closely interlinked: the better equipped a company is with technology and the more appropriate competencies, and skills employees have to use technology, the greater the opportunity to increase the competitiveness of companies and to gain economic, social, environmental and consumer benefits for the country (Bikse et al., 2021). But digital technology does not only have to have a positive impact on the labour market. Econometric models of what jobs, or parts of jobs, could be replaced by digital technologies are being developed, and then it is assumed that these jobs will be affected in this way (Fleming, 2018).

3. Methods

3.1. Aim

The study aims to analyse the impact of COVID-19 on the readiness of medium-sized enterprises in the Visegrad Four countries for employee training using ICT.

The paper will also examine the relationship between ICT training and the digital development of the Visegrad Four economies in 2022. The paper responds to the increasing importance of ICT in employee training.

3.2. Data Source

Secondary data, which will be obtained from the Eurostat database, specifically from the Digital economy and society database, will be analysed and compared in a time context for the survey.

In addition, data from the DESI index will be used, which is a composite index that summarises relevant indicators of Europe's digital performance and tracks developments in the digital competitiveness of EU Member States.

The study will focus on the Visegrad Four countries, i.e., Czech Republic, Poland, Hungary and Slovakia. Only data from these countries' medium-sized enterprises (50-249 employees, excluding the financial sector) will be selected. For descriptive statistics, the period 2017-2022 will be chosen, while only the year 2022 will be chosen to compare the relationship between the selected indicator and the DESI index. The data represent % of medium-sized enterprises for different variables.

The first variable examined is Enterprises provided training to their personnel to develop their ICT skills which is broken down by company size and is measured annually. Second variable examined is Covid-19 Impact on ICT usage by size class of enterprise which was only measured in one year, 2020. Third variable from Eurostat database is Individuals' level of digital skills. This variable is measured every two years.

3.3. Statistical analysis

Statistical analysis was performed in two steps. First, descriptive statistics were carried out for relevant indicators for which comparisons were made between the Visegrad Four countries over several years. This comparison serves to identify the extent of the impact of the COVID-19 pandemic on the readiness of each country for employee training with the use of ICT. Secondary data were obtained from the Eurostat database. The Kruskal-Wallis test was used to compare the selected indicator with the DESI index to reveal the relationship between digital economic development and the percentage of enterprises providing training to their personnel to develop their ICT skills of the Visegrad Four countries. This test is used to compare two or more independent data samples of the same or different sizes. It is a non-parametric method, so normality of the data is not required. We compare the relative position of the data. The hypothesis of this study was: There is a positive relationship between the selected indicators of the DESI index (Human Capital and Integration of Digital Technology) and the indicator of ICT employee training in enterprises of the Visegrad Four countries.

4. Results and Discussion

4.1. Enterprises provided training to their personnel to develop their ICT skills

The following table, Table 1, presents the share of medium-sized enterprises that provide training to their employees to develop their ICT skills between 2017 and 2022. An increasing trend was observed for Hungary and Poland, with a difference of more than 18 percentage points for Poland. Poland registered a big jump in percentage of medium-sized enterprises offer such training in 2020 and again in 2022, implying that COVID-19 might be the reason.

On the other hand, the Czech Republic and Slovakia did not show an increasing trend, on the contrary, a slightly decreasing trend between 2020 and 2022 (COVID-19). Slovakia had the lowest share in 2022 compared to the other Visegrad Four countries, but the Czech Republic was in second place, just behind Poland. The reason for this is unknown and may yet be the subject of further research.

TABLE 1. PERCENTAGE OF MEDIUM-SIZED ENTERPRISES PROVIDING TRAINING TO THEIR PERSONNEL TO DEVELOP THEIR ICT SKILLS

Country	2017	2018	2019	2020	2021	2022
Czech Republic	43.4	44.2	45.7	44.0	-	43.4
Hungary	28.8	29.5	29.2	30.6	-	34.2
Poland	25	27.1	26.4	32.7	-	43.5
Slovakia	28.5	29.7	33.8	32.8	-	26.3

Source: Own compilation, based on Eurostat (2023)

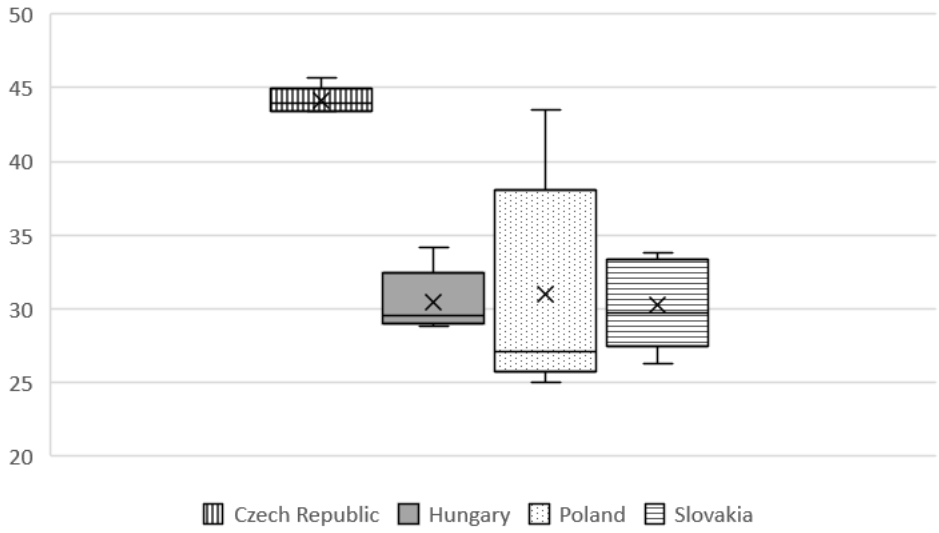
Table 2 presents values such as the minimum, maximum, first and third quarters, as well as the range between the minimum and the maximum. Again, the values in the tables represent the % of medium-sized enterprises. The same values are illustrated in Figure 1.

TABLE 2. CALCULATION OF QUARTILES FOR THE SHARE OF MEDIUM-SIZED ENTERPRISES PROVIDING TRAINING TO THEIR EMPLOYEES TO DEVELOP THEIR ICT SKILLS

Country	Min	Q1	Medium	Q3	Max	Range
Czech Republic	43.4	43.4	44	44.2	45.7	2.3
Hungary	28.8	29.2	29.5	30.6	34.2	5.4
Poland	25	26.4	27.1	32.7	43.5	18.5
Slovakia	26.3	28.5	29.7	32.8	33.8	7.5

Source: Own compilation, based on Eurostat (2023)

FIGURE 1. BOX PLOT DIAGRAM FOR VARIABLE: PERCENTAGE OF MEDIUM-SIZED ENTERPRISES PROVIDING TRAINING TO THEIR PERSONNEL TO DEVELOP THEIR ICT SKILLS



Source: Own compilation, based on Eurostat (2023)

The middle "box" part of the diagrams in Figure 1 is bounded by the 3rd quartile from above, the 1st quartile from below, and the line between them defining the median. The whiskers coming up or down from the boxed part indicate the variability of the data below the first and above the third quartile. Outliers are marked with a 'T'. The largest "boxed" portion in Figure 1 represents Poland, which (as mentioned above) experienced the largest growth between 2017 and 2022 (especially 2019 and 2022).

4.2. Covid-19 Impact on ICT usage – Percentage of medium-sized enterprises

Data from Eurostat shows the percentage of medium-sized companies that increased the percentage of employees who had remote access to email, other ICT systems and the percentage of companies that increased the number of remote meetings, for example via MS Teams, during 2020. Data for the Czech Republic is not available. Slovakia had the highest percentage of companies in all three categories. In the case of the last category (Enterprises increased number of remote meetings conducted by the enterprise), more than 50 % of companies had increased the number of remote meetings held in all three countries. The data is shown in Table 3.

TABLE 3. PERCENTAGE OF MEDIUM-SIZED ENTERPRISES WHERE COVID HAS HAD AN IMPACT ON ICT USAGE

Country	Enterprises increased % of persons employed having remote access to its e-mail system	Enterprises increased % of persons employed having remote access to the ICT systems of the enterprise other than e-mail	Enterprises increased number of remote meetings conducted by the enterprise (e.g. via Skype, Zoom, MS Teams, etc.)
Czech Republic	-	-	-
Hungary	28.7	30.6	61.9
Poland	33.2	42	55
Slovakia	43.2	51.6	66.9

Source: Own compilation, based on Eurostat (2023)

4.3. Digital Skills

Digital Skills Indicator data are available for 2017, 2019 and 2021 and are shown in the Table 4. The Czech Republic ranked highest among the Visegrad Four countries in terms of digital skills. However, it should be noted that the percentage was lower compared to 2019. Hungary had been at a very similar level for all three years, while the level of digital skills in Poland had been continuously decreasing and in 2021 was the lowest among the Visegrad Four countries at just under 43 percent. The indicator for Slovakia decreased significantly in 2019 compared to 2017, and increased again slightly in 2021, but was still at a lower level than in 2017. Therefore, it can be seen that although it would be expected that the level of digital skills would increase significantly after covid-19, this is not the case for the Visegrad Four countries. The author of the article would like to focus her further research on exploring why the level of digital skills has not increased.

TABLE 4. PERCENTAGE OF INDIVIDUALS WITH BASIC OR ABOVE BASIC OVERALL DIGITAL SKILLS

Country	2017	2019	2021
Czech Republic	59.85	62.10	59.69
Hungary	49.59	48.68	49.09
Poland	46.38	44.45	42.93
Slovakia	59.01	53.87	55.18

Source: Own compilation, based on Eurostat (2023)

4.4. Relationship between DESI index and enterprises provided training to their personnel to develop their ICT skills

Given that the development of ICT training is a prerequisite for the development of the digital economy, an investigation of the correlation between selected DESI index indicators (Human Capital and Integration of Digital Technology) and the percentage of enterprises providing training to their employees to develop their ICT skills was carried out. The assumption was that there is a positive relationship between these indicators.

For this study, the DESI index indicator – Integration of Digital Technology – was selected, specifically three dimensions were examined, namely Digital intensity, Digital technologies for business and e-Commerce. The second indicator chosen was Human Capital, specifically two dimensions – Internet User skills and Advanced skills and development. The individual values of these two indicators are shown in Table 5 and Table 6. For the Kruskal-Wallis test, only the year 2022 was chosen. The values in the tables represent the scores (0-100).

The Integration of Digital Technology indicator showed a year-on-year increase for all 4 countries. The Czech Republic showed the highest values in 2022, followed by Slovakia. When comparing the values of 2022 with 2019 (before COVID-19), the Czech Republic again had the highest increase of 7.78 points.

Human Capital was examined as the second indicator. The Czech Republic, Poland and Slovakia showed an annual increase, while Hungary had a slight decrease in 2018 (compared to 2017), then an increase until 2021 and again a slight decrease in 2022. In 2022, the Czech Republic showed the highest values, with Slovakia again in second place. Slovakia had the highest increase from 2019 (before COVID-19) to 2022, with 4.1 points.

TABLE 5. DESI INDEX: INTEGRATION OF DIGITAL TECHNOLOGY

Country	2017	2018	2019	2020	2021	2022
Czech Republic	22.78	24	26.03	30.51	32.55	33.81
Hungary	12.89	14.62	15.55	16.61	18.33	21.57
Poland	12.67	14.55	16.61	18.94	20.58	22.89
Slovakia	19.22	21.97	22.99	24.33	26.26	27.85

Source: Own compilation, based on ec.europa.cz (2023)

TABLE 6. DESI INDEX: HUMAN CAPITAL

Country	2017	2018	2019	2020	2021	2022
Czech Republic	40.7	41.1	43	43.7	44.4	45.6
Hungary	36.4	35.9	36.5	37.1	38.7	38.4
Poland	32.2	32.8	33.9	34.7	36.3	37
Slovakia	37.6	38.9	40	42	43.3	44.1

Source: Own compilation, based on ec.europa.cz (2023)

To compare the relationship between the indicators from the DESI index (Human Capital and Integration of Digital Technology), the third indicator selected was Enterprises provided training to their personnel to develop their ICT skills. The values of the indicators including the result of Kruskal-Wallis test is shown in Table 7.

TABLE 7. COMPARISON OF DESI INDEX INDICATORS AND ICT EDUCATION IN ENTERPRISES

Country	Indicators			Kruskal-Wallis test	
	Human Capital	Integration of Digital Technology	Enterprises provided training to their personnel to develop their ICT skills	H	p-value
Czech Republic	45.6	33.81	43.4	6.6154	0.0366*
Hungary	38.4	21.57	34.2		
Poland	37	22.89	43.5		
Slovakia	44.1	27.85	26.3		

Source: Own compilation (2023)

*statistically significant at 5%

The critical value was 5.9915, so the value of H (6.6154) was higher than the critical limit. Hence, we rejected the positive relationship between these variables.

5. Limitations of this research

This research has several limitations. The data reported summarize an entire year which misses the dynamics of what happens in between. Hence, this analysis as such does not fully reflect a dynamically evolving system. Eurostat does not publicly state what percentage of all companies participated in their survey. It is also impossible to verify whether all respondents answered according to the truth and the real situation in the company.

6. Conclusion

The aim of the paper was to analyse the impact of COVID-19 on the readiness of medium-sized enterprises in the Visegrad Four countries for employee training with the use of ICT. The paper also examined the relationship between ICT training in 2022 and the digital development of the Visegrad Four economies. The first indicator examined was the percentage of medium-sized enterprises that provided training to their employees to develop their ICT skills. It was found that Poland recorded the biggest jump between 2019 and 2022. Hungary also recorded growth in this period. It can be assumed that it is thanks to COVID-19 that enterprises have started to pay more attention to such training. Unfortunately, the Czech Republic and Slovakia experienced a slight decline in this period before and after COVID-19; the reason for this is unclear and may be subject to further investigation. In 2022, Poland had the largest percentage of companies, with the Czech Republic in second place with an almost identical result.

Another indicator examined was the impact of COVID-19 on ICT use. This indicator was only measured in 2020 and was not measured in the Czech Republic. Three aspects were examined in this study – the percentage of companies that increased the number of employees with remote access to email, remote access to other ICT systems beyond email, or increased the number of remote meetings through platforms such as MS Teams, Zoom, etc. Of the three countries surveyed, Slovakia has the highest results, followed by Poland and then Hungary.

The third indicator examined was Digital Skills, which is only available for certain years. Comparing 2019 (pre-COVID-19) with 2021, no impact of this pandemic was shown. Some countries experienced a slight increase, but some experienced a decline.

DESI indicators, namely Integration of Digital Technology and Human Capital, were also examined. The former shows an annual increase for all countries studied, and it cannot be said that the COVID-19 pandemic has had an impact on this growth, as there is no greater jump between 2019 and onwards than in previous years. The same is applicable to the second indicator examined, Human Capital.

The paper also verifies the relationship between the development of the digital economy of countries and ICT education in medium-sized enterprises in 2022. For this verification, the Kruskal-Wallis test was chosen, and it showed no positive relationship between the selected indicators. Thus, it can be assumed that the different levels of development of the digital economy in the Visegrad Four countries have no effect on the share of medium-sized enterprises that provide training to their employees in order to acquire or improve ICT skills.

This research is an important contribution to the literature. It can be assumed that as the pandemic unfolds, educational design will become even more important and practitioners will focus on combining traditional employee training with modern forms of employee training using ICT. Learning and development practitioners should take greater account of changing and unpredictable realities, as well as the evolving nature of ICT.

Further research will focus on some of the time series fluctuations in the examined indicators mentioned above, which were expected to increase but instead show a decrease. The author recommends that companies continue to increase their interest in improving the digital skills of their employees, as the industrial revolution continues and modern technologies become more and more prominent, even though COVID-19 is no longer such a threat to companies.

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