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Analýza vývoje sdílení znalostí prostřednictvím digitalizace v organizacích pomocí indexu digitální ekonomiky a bezpečnosti

Analysing the Evolution of Knowledge Sharing Through Digitalization in Organizations Usingh the Digital Economy and Security Index

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Abstrakt

Digitalizace je jedním z hlavních katalyzátorů inovací v řízení moderních organizací. Jedním z hlavních efektů, které přináší proces digitalizace a používané nástroje, je sdílení informací a znalostí uvnitř i vně společností. Existuje mnoho měřítek digitalizace a sdílení znalostí, včetně indexu DESI neboli Digital Economy and Security Index, který se skládá z několika položek digitální připravenosti organizace. Pro účely tohoto výzkumu bylo provedeno dotazníkové šetření v organizacích v České republice, které porovnávalo vývoj jednotlivých ukazatelů v průběhu pěti let. V rámci dotazníkového šetření se podařilo shromáždit přes pět set odpovědí. Tyto data pomohou určit tempo vývoje nástrojů, které mají organizace k dispozici v procesu sdílení znalostí prostřednictvím vývoje digitalizace.

Klíčové slová: Sdílení znalostí, Digitalizace, DESI

Abstract

Digitalization is one of the main catalysts for innovation in the management of modern organizations. One of the main effects of the digitisation process and the tools used is the sharing of information and knowledge inside and outside companies. There are many digitalization and knowledge-sharing measures, including the DESI, or Digital Economy and Security Index, which consists of several items of an organization's digital readiness. For this research, a questionnaire survey was conducted in organisations in the Czech Republic, comparing the development of each indicator over five years. The questionnaire survey managed to collect over five hundred responses. These data will help determine the pace of development of the tools available to organisations in the process of knowledge sharing through digitalisation.

Keywords: Knowledge Sharing, Digitalization, DESI

JEL Classification: O31, O33

Introduction

Digitalisation is one of the main catalysts for innovation in the management of modern organisations. Digitalization itself serves as a vital tool for improving the efficiency and speed of processes, leading to profits and keeping organizations competitive in today's volatile market. One of the main effects brought by the digitalization process and tools that are used is information and knowledge sharing inside and outside the companies. There are many measures of digitalization and knowledge sharing, including the DESI, or Digital Economy and Security Index, which consists of several headings of an organization's digital readiness. The Commission of the European Union publishes this index, and it is one of the primary indicators assessing the digital maturity of organizations in EU countries and shows the tools for sharing the knowledge. For this research, a questionnaire survey was conducted in organizations in the Czech Republic, comparing the development of each indicator over five years. The questionnaire survey managed to collect over five hundred responses. These data will be processed, and the indices will be compiled within a specified time frame and based on the main activity carried out by the organization. This comparison will help identify the pace of development of tools available to organisations in the process of knowledge sharing through evolution of digitalization. The last part of this paper will provide recommendations for future research.

1 Theoretical Framework

Digitalization is one of the critical factors in the invotation process as of late. Ferreira et al. (2022) state that its complexity requires a shift in the behaviour and culture of the organizations. Ivanova et al. (2019) write about the changes that are brought about by digitalization—especially changes in the labour market and socio-economic landscape. Effectivity navigates the changes; organizations must adapt to these new conditions or lose the upper hand in the current market. Various studies such as Baier et al. (2022), Althukova (2019), Stoyanova (2020), and others describe the challenges met in the implementation of these digitalized processes and technologies. These barriers are, for example, not understanding the holistic view of digital transformation. Not understanding the role of leadership, or not pushing for change at the top management level. All studies agree on the level of difficulty that goes hand in hand with successful digitalization.

Contrary Contrary to those adverse effects that can be caused by the not-so-efficient way of implementing digitalization tools into the organization, there are some explicit benefits if the process is handled well. Those effects, according to the educated public, are:

- Enhanced effectivity and productivity: according to Truant et al. (2021), Digitalization allows the automatization of routine processes and workflows, which helps to save time and boost effectivity at the same time. Thanks to the digitalization process and the tool that comes with it, organizations can handle recourses more effectively. They can lower the costs of routine and easy tasks that were not automated.

- More efficient decision-making: The digitalization process allows information gathering and helps analyze a large amount of data. Peng et al. (2023) describe that these data sets can provide the necessary information for the decision-making process. These datasets are easily converted to sizable details, which can boost and make the decision process more effective as is.
- Improvement of competitiveness: Yuleva–Chuchulayna (2021) states that digitalization has become the necessary predisposition for becoming competitive in this digital era. Organizations that utilize new technologies and benefit from those are more competitive and can stay relevant in these turbulent times.
- Boosting the efficiency of customer relations and services: Various studies from Costa et al. (2024), Cobelli and Chiarini (2020), and Parvianen et al. (2017) state that the process of Digitalization positively influences the ability to understand customer demands and their behaviour better. With all other benefits of Digitalization, this can positively boost the customer care process.
- Improving communication, cooperation, and the knowledge-sharing process: Digitalization as a concept helps with its various tools to significantly enhance the process of communication and information sharing. Vuori et al. (2019) and Suominen & Mäenpää (2017) point out that obtaining and sharing knowledge in the organization becomes one of the benefits that increases with the level of Digitalization inside the organization.

As mentioned above, the process of knowledge sharing is positively influenced by the presence of digitalization in organizational structures. Knowledge sharing is influenced by various factors, including social and economic topics, says Lee & Al-Hawamdeh (2002). According to King (2011), these factors are significant for organizations that rarely process knowledge sharing to ensure their competitive advantage. However, according to Holdt Christensen (2007), there are some obstacles; one of those examples is needing to create the context of community literacy. Many studies discuss the modern procedures for knowledge sharing. For example, Tangaraja et al. (2016) state that the best-case scenario is that user-generated media is a valuable tool for knowledge sharing.

Digitalization has significantly impacted the process, particularly in higher education and the processes revolving around sustainable development. Platonova et al. (2022) suggest that online knowledge-sharing mechanisms are the main transforming force of the change in these processes, and those mechanisms are a direct outcome of the digitalization process. For example, social media outlets are among the leading innovative platforms for sharing knowledge. Ahmed (2019) points out that the use of social media in the process of knowledge sharing can bring the necessary focus on user behaviour and utility. A range of studies, for example, papers from Gonçalves &

Oliveira (2021) or Oanță (2020), explore using those new digital platforms for knowledge-sharing. They highlight the potential of the platforms that can wildly spread knowledge and identify critical factors and challenges in the process. These studies suggest specific applications like digital teaching recourse platforms and knowledge banks. Those research papers collectively point out digitalization's diverse and impactful roles in facilitating knowledge inside and outside the organization. Possible measurements can be applied to discover the level of those tools and digitalized platforms that can be used to determine the range and possibility which can be utilized to improve the knowledge-sharing process. Digital Economy and Social Index (DESI) was used as a possible rating for such a topic.

2 Materials and Methodology

A range of metrics have been proposed for measuring the level of digitalization from the topics of the digital economy to industry, enterprise, or even society and clients, says Kotraba (2017). These metrics even evolve topics such as the percentage of people making online purchases, which can be used to estimate the degree of digital transformation, as mentioned in Chetty et al. (2018) research paper, which explores those metrics as a whole. In the public sector, the success rate of IT technology projects, their price compatibility, and the modernity of government solutions using those IT technologies are key indicators, according to Febiri and Hub (2020). There are methodological approaches to accessing the levels of digital transformation, such as the ICT Development Index, Digital Evaluation Index, World Digital Competitiveness Index, or Digital Economy and Society Index. As mentioned in the literature, the DESI index was used for this research paper to create the link between knowledge sharing and digitalization. Based on the research paper from Viknianska et al. (2021), the Index itself contains the technologies and aspects that help to improve the process of knowledge transfer, so in logical conclusion, using this Index can determine the maturity of the tools used to share knowledge inside the organizations. According to Zaharia and Bălăcescu (2020), The Digital Economy and Society Index, or shortened DESI, is a crucial tool for accessing the digital policy performance of EU Member states and organizations that operate in these member states. The sociometric factors influence the Index. Jovanović et al. (2018) refer to this topic as such: Digitalization measured by DESI is crucial for sustainable development, impacting economic, social, and environmental compacts. The Digital Economy and Society index is measured by the European Commission, which has monitored the progress since 2014. For the study, the 2019 version of the Index was used to determine the change in 2019 and 2023. The Index consists of various findings. The relevant measurement of the Index is a key indicator tracking the digitization process. The report itself discerns these twelve indicators.

Table 1: DESI digitization indicators

Key indicators tracking digitization processes
The organization uses ICT* security measures.
The organization trains staff on the need to use ICT safeguards.
The download speed of the fastest internet connection is at least 30 Mbps.
The organization uses ERP** software to share information.
The organization has social media (any).
The organization uses social media.
The organization uses customer relationship management (CRM)** software.
>50% of employees use computers and the Internet.
>20% of employees work with portable devices.
The organization sells online (at least 1% of turnover).
The organization accepts electronic orders from customers in other EU countries.
Organizations > 1% of total web sales and B2C web sales > 10%.

Source: Original work, 2024

* ICT: Information and Communications Technologies is an extensional term for information technology that stresses the role of unified communications and the integration of all enterprise software altogether.

**ERP: Enterprise resource planning is a software system that helps manage and integrate the essential parts of a business. ERP systems are complete, integrated platforms that combine multiple business processes and enable data flow across them.

***CRM: Customer Relationship Management is a technology that manages the company's interactions with current and potential customers. CRM is software that helps to track each interaction and tie it with prospects or customers.

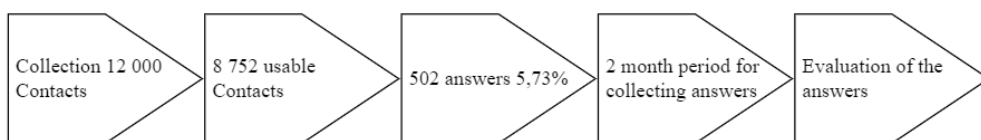
Some of the factors were excluded to connect with the knowledge transfer process. Excluded factors are

- The organization sells online (at least 1% of turnover);
- The organization accepts electronic orders from customers in other EU countries;
- Organizations > 1% of total web sales and B2C web sales > 10%
- The fastest internet connection download speed is at least 30 Mbps.

So, that leaves us with the eight variables connected. A quantitative model was used to gather answers to the abovementioned topics. Using quantitative questionnaires in research has been a topic of interest in various fields, according to Humble (2020). Brigham (1975) provided a comprehensive and holistic overview of quantitative methods for business decisions, including the processes of data collection, descriptive statistics, and statistical interferences.

The process of data collection is identified in Figure 1. The contacts were taken using the AI method of random pics in the official database of the companies operating in the specific market, which means the Czech Republic. The AI gathered twelve thousand companies. The companies' specifications without the possibility of contacting them were ten thousand two hundred and forty-five companies. Only eight thousand seven hundred fifty-two companies had working and existing email. There were five hundred and two returns, which makes the questionnaire 5,73%.

Figure 1: Collecting the questionnaires



Source: Original work, 2024

Time series analysis is used to determine the change in the materials gathered by the questionnaire. Hamilton (1994) defines *time series analysis* as studying ordered events and/or observations with a specific time component. This specific type of analysis is commonly used in economics or business analysis. It is possible to reveal essential patterns or show the development in the specified period, according to Molugaram (2017). Some extensions of the classical time series analysis are, for example, according to Velicer (2003), ARIMA (Autoregressive Integrated Moving Average), a model that uses time series data to understand the data set better or predict future trends. A statistical model is autoregressive because it predicts future values. For this study, the primary time analysis was used to determine the change in values in the observed years.

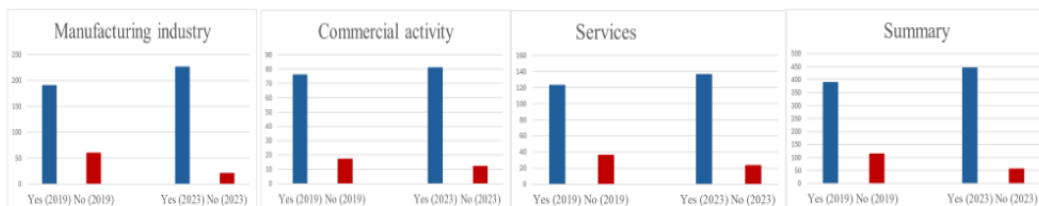
3 Results and Discussion

Additional questions were defined to capture the education report across all the sectors. The questionnaire was answered by one hundred and forty women (27,9%), three hundred and sixty-one men (71,9%), and one respondent identified their gender as other (0,2%). The respondents varied by the age. In the category from age 21-30, there were 94 (18,7%, in category 31-40, 151 (30,1%); in 41-50, there were 143 (28,5%); in category 51-60, there were 78 (15,5%) and in the last category which was defined as 61 above there were 36 (7,2%) responders. Most respondents obtained a university education, precisely 305 (60,8%). My last personal question was to answer their current job position. 142 (28,3%) were from top management, 127 (25,3%) were

from middle management, 105 (20,9%) were from lower management, and 128 (25,5%) were from other than managing positions.

The results were divided for all three branches of industry: Manufacturing industry, there were 250 (49,8%) answers from this sector. There was 93 (18,5%) from the commercial activity sector and 159 (31,7%) from services. This serves as the index to discern the fastest-growing branch in terms of using digitalized tools for knowledge sharing. The last row in each row represents the summary of all the results.

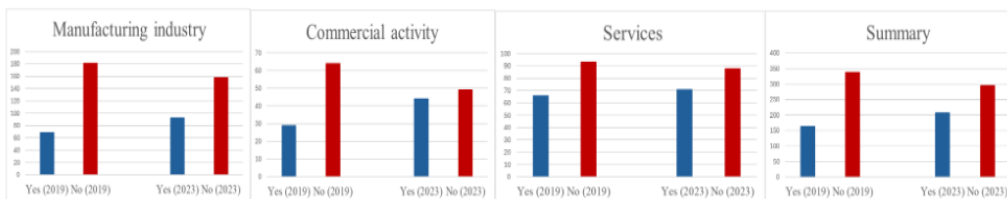
Figure 2: The organization uses ICT security measures.



Source: Original work, 2024

The first question was the topic of ICT security measures. The overwhelming positive answer was collected. The growth between years was from left to right: 14.4%, 5.4%, 8.2%. We can see that the fastest growing industry is manufacturing, but the starting point of the value itself was satisfactory enough that around 70-80% of the companies in all branches were compliant with those measures even in the year 2019.

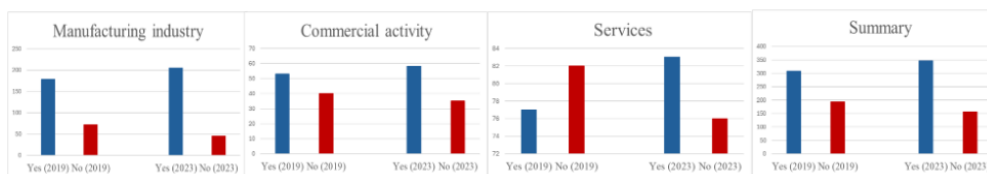
Figure 3: The organization trains staff on the need to use ICT safeguards.



Source: Original work, 2024

As was the implementation of the ICT security measures prominent in the positive answer, the process of training those measures and teaching their importance is the exact opposite. The highest growth is in the commercial activity sector, at 16,1%. The lowest one is in the services for 3,1%. The industry takes second place with a value of 9,2% growth. The starting positions of positive answers are between 30-50%, which is significantly lower. The trends show that the change will not be fast if we exclude the commercial activity sector.

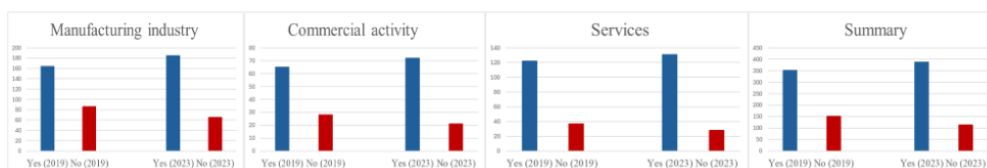
Figure 4: The organization uses ERP software to share information.



Source: Original work, 2024

According to the survey, ERP software is the bread and butter of manufacturing companies. In 2023, 82% of responders answered yes to having and using the ERP system. The growth of this branch is the biggest one too with a value of 10,8%. Then the commercial sector is 5,5% and the services only 3,8%. Overall, we are talking about the changes and adaptation of the systems as is. As written in the scientific literature, the prediction is that the commercial sector and services will follow the manufacturing industry.

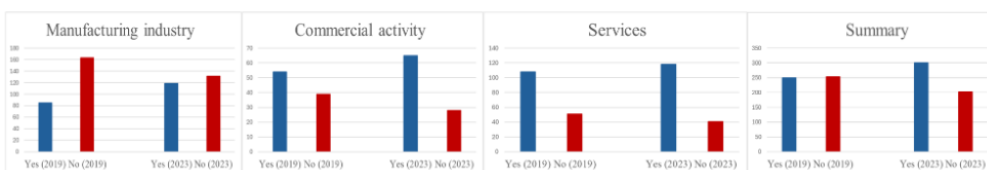
Figure 5: The organization has social media (any).



Source: Original work, 2024

If we ask about any social media in the context of knowledge management and knowledge sharing, we are talking about something other than the presentation of the external factors. We are talking about the internal communication. Which means intranets, video storage sites, and so forth. As seen in the graphs, social media is a phenomenon commonly used in companies for both purposes: to create networking, better share inside information, and let employees acquire knowledge more efficiently and faster. The growth in the observed years is slower, but all the branches show growth of around 7%. The fastest one is the manufacturing industry with 8,4%.

Figure 6: The organization uses social media.

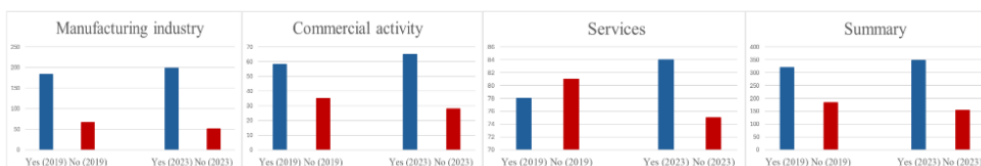


Source: Original work, 2024

Many media have social media, but the use of social media is another topic that needs to be discussed. The problem is that many companies only have the media to preserve the company details so as not to be replicated by scammers or such. There are

significant differences between the starting point from the service industry, which is overwhelmingly active on social media, and the manufacturing industry, which is not commonly active. The commercial activity sector is in the middle but has registered 12% growth over the years. The highest growth is registered for the manufacturing industry, with 14%, and the lowest for services, with 6%. This growth rate is not surprising because of the starting position of those branches.

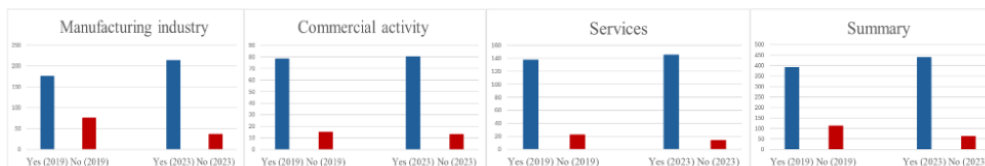
Figure 7: The organization uses customer relationship management (CRM) software.



Source: Original work, 2024

The use of CRM software in the manufacturing industry is no surprise, and growth of only 6,4% is understandable because of the starting position with many companies that already have the system. On the other hand, the service industry's starting position is different. In 2019, using and not using the CRM software was 50,9% for not using the software and 49,1% for having the software. The change in years counts only for 3,8%, compared with the worth of the manufacturing industry almost halved. The commercial activity branch then registers the highest growth for 7,7%.

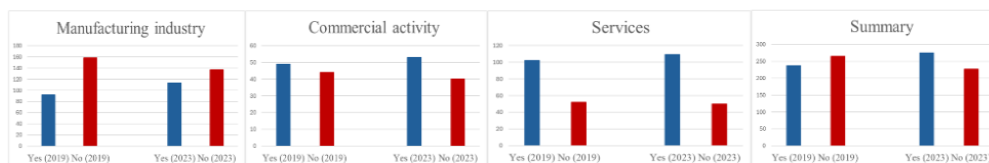
Figure 8: >50% of employees use computers and the Internet.



Source: Original work, 2024

Using computers and the Internet in the company's processes is one of the main tools in digitalization. Industries across the board wildly have more than 70% of employees using the Internet or computers, which is an overwhelming start. The fastest elimination of the companies without the Internet can be monitored in the manufacturing industry with 15,6%, with the main reason being that the industry was in the worst position to start with. The second fastest is the services with 2,2%, and the use is commercial activity companies with 5,1%. Nevertheless, the trend in this question is clear: the use of computers and the Internet is now the norm for all companies across all branches. The total sum of all asked companies with the positive response for 2023 is 87,4%.

Figure 9: >20% of employees work with portable devices.



Source: Original work, 2024

The last topic asked regarding the tools of digitalization that can be utilized for knowledge sharing inside organizations is the number of employees who can work with portable devices such as tablets. The Trends in this are clear: the Services industry is far ahead of the manufacturing and commercial sectors. Nevertheless, the growth in the services industry is stable and accounts for 4,3%. The most negative starting position regarding this topic is the manufacturing industry. However, the industry compensated it with a growth of 8,4%, which is almost double the growth recorded in services. The last branch, the commercial sector, is nearing the starting position of manufacturing but only shows a change rate of 4,4%.

Table 2: Value summary table

Answers and questions	Manufacturing Industry	Commercial Activity	Services	Summary
The organization uses ICT security measures.				
2019: Yes/No	190/60	76/17	123/36	389/113
2023: Yes/No	226/21	81/12	136/23	446/56
The organization trains staff on the need to use ICT safeguards.				
2019: Yes/No	69/181	29/64	66/93	164/338
2023: Yes/No	92/158	44/49	71/88	207/295
The organization uses ERP software to share information.				
2019: Yes/No	178/78	53/40	77/82	308/194
2023: Yes/No	205/45	58/35	83/76	346/156
The organization has social media (any).				
2019: Yes/No	164/86	65/28	122/37	35/151
2023: Yes/No	185/65	72/21	131/28	388/114
The organization uses social media.				
2019: Yes/No	85/163	54/39	108/51	249/253
2023: Yes/No	119/131	65/28	118/41	300/202
The organization uses customer relationship management (CRM) software.				
2019: Yes/No	183/67	58/35	78/81	319/183
2023: Yes/No	199/51	68/28	84/75	348/154
>50% of employees use computers and the Internet.				
2019: Yes/No	175/75	78/15	137/22	390/112
2023: Yes/No	214/36	80/13	145/14	439/63
>20% of employees work with portable devices.				
2019: Yes/No	92/158	49/44	102/52	237/265
2023: Yes/No	113/137	53/40	109/50	275/227

Source: Original work, 2024

Summarizing the findings, it is clear that most changes are happening in the manufacturing industry, which is starting to use the technologies in faster phases than other sectors. However, the message is clear: all the sectors are monitoring some growth in every research subject asked. We can state that the process is improving, and we can monitor the improvement of those technologies in future years. Those technologies will then further improve the process of knowledge sharing and the process of information transfer and, in the grand picture, better the company as a whole, which will bring people to ideas to improve those technologies again, and the cycle repeats.

Záver

Na základe zjistení popsaných v tomto článku môžeme s istotou ríci, že proces digitalizácie ešte neskončil. Podniky stále transformujú své nástroje, ktoré lze využiť pro ukládání a transformaci znalostí. Samozřejmě existuje argument, že nástroje potřebné pro sdílení znalostí se liší, ale překomponované procesy a technologie jsou totožné. Tato studie poukazuje na počet společností, které mají tyto nástroje k dispozici, a zaznamenává růst těchto nástrojů v letech 2019 a 2023. Dvěma významnými zjištěními tohoto výzkumu je, že jedinými nástroji, které se běžně nepoužívají ve všech odvětvích, jsou přenosná zařízení, jako jsou tablety, a postupy, které učí významu ochranných nástrojů ICT. Ze zjištění vyplývá, že ve všech zkoumaných oborech dochází v roce 2023 k pozitivnímu nárůstu firem, které využívají technologie více než dříve. Lze také identifikovat trendy, že v budoucnu budou tato čísla dále a dále růst. Samotný výzkum má své limity, a to využití pouze jednoho trhu, a to České republiky. Dalším limitem je, že jsme pozorování prováděli pouze ve dvou letech. I tyto dvě připomínky jsou možným předmětem budoucího výzkumu. Možnost rozšíření výzkumu na další trhy v jiných státech může poskytnout ucelený pohled na trendy v současné době digitalizace. Opětovné provedení výzkumu za několik let může vytvořit zajímavější časové rozvrhy zaznamenaných změn ve firmách, které mohou vytvořit modely pro predikci růstu využívání nástrojů v budoucnosti.

Resume

In the highlight of the findings described in this paper, we can safely indicate that the process of digitalization is not over. Companies are transforming their tools, which can be used for knowledge storage and transformation. Of course, there is an argument that the tools needed for sharing knowledge differ, but the overcomposing processes and technologies are identical. This study highlights the number of companies that have these tools available and records the growth of those tools in 2019 and 2023. Two significant findings from this research are that the only tools not commonly used in all the sectors are portable devices such as tablets and procedures that teach the importance of the safeguard tools of ICTs. The finding is that in all researched fields, there is positive growth of companies that use the technology more in the year 2023 than before. We can discern the trends that, in the future, these numbers will grow further and further. The research itself has its limits, namely, the use of only one market, the Czech Republic. The other limit is that we made observations only in two years. Those two remarks are also possible future research.

The option to widen the research on other markets in other states can give a holistic view of the trends in the current age of digitalization. The revisiting of the research in a few years can create more exciting timetables for the changes recorded in the companies, which can create the models for the prediction of the growth of usage of tools in the future.

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