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# **THE EMERGING CHANGES IN THE ACCOUNTING PROFESSION AND THE ACCOUNTING PRACTICE UNDER THE INFLUENCE OF TECHNOLOGY**

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**Abstract:** The implementation of new technologies in accounting brings many benefits for the future, but also carries many risks. In the current digital era, the adequate practical application of technologies in accounting can become a strategic advantage for companies. In relation to the digitalisation and the upcoming organizational changes, both in the sphere of accounting and in the companies themselves, accounting specialists are a key factor for success. This study gives a thorough overview and analysis of specialised literature in this area and a number of empirical studies. The results show that the literature mainly focuses on certain technologies, while other are actually used in practice. Differences have been identified between the accounting practices of the USA and the European countries. The authors outline three directions in which technologies help accounting teams to transition to modern accounting and effectively perform their tasks in the digital world. The conclusion is that today, specialised skills and strategic thinking of accounting specialists are particularly important and in the near future, they will not be entirely displaced by technologies.

**Keywords:** accounting profession, digitalisation, modern technologies in accounting, continuous accounting, strategic analysis, business partnership.

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## Introduction

**T**he way we perceive accounting today and what it will be tomorrow shapes the state and future of the accounting profession. G. Carnegie (Carnegie et al., 2021), considering the existing definitions, found that they do not reflect the basic nature of accounting in the modern world.

He spoke of the need to redefine the subject as "a technical, social and moral practice concerned with the sustainable utilisation of resources and proper accountability to stakeholders to enable the flourishing of organizations, people and nature" (Carnegie et al., 2022a). This new proposal emphasizes *the multidimensional social and moral practice* of accounting, not just its technical aspect. G. Carnegie argued that how accounting is defined today and what it will be in the future determines the purpose, value and identity of the accounting profession" (Carnegie et al., 2022b). The proposed definition engages with "the full dimensions of accounting and reflects its growing interdisciplinary orientation" (Carnegie et al., 2022b).

In today's digital age, the transition to a virtual professional world is not easy, but what may seem like chaos could turn into a strategic advantage. And to turn it into a strategic advantage, it is necessary to use adequate technologies.

The subject of the present study are the changes that occur both in accounting as a practical activity and in the profession itself as a result of digitalization. The aim is to investigate the degree of adoption by the practice of the various information and communication technologies. From a methodological point of view, this publication is an in-depth review and analysis of both the specialized literature and empirical studies of practice. The results show that the technologies adopted in practice differ from those mostly discussed in literature. Differences have also been found between the accounting practices of the USA and European countries. Companies have been gradually moving to digitalization of their financial and accounting processes, paying more and more attention to cyber risks. In addition, the conclusion is drawn that the specialized skills, strategic and creative thinking of accounting specialists

are particularly important now and will not be displaced by artificial intelligence in the near future.

## **1. Transformations in the accounting profession under the influence of digitalisation**

Nowadays, with the wide application of information and communication technologies, the accounting profession has begun a process of development at a global level and has been experiencing significant changes. With the development of information technology, it has become common practice to do accounting in an electronic environment, both in the public and private sectors. Today, in line with the development of information technology, "paper" accounting has been replaced by digital invoice, digital declaration and digital ledger, which, in turn, requires knowledge on specialized information analysis, fraud prevention, unfair competition, information security etc. In this sense, the accounting staff must keep up with the digital transformation.

### ***1.1. What is the influence of technologies on the accounting profession?***

The environment in which businesses operate has been changing, public expectations of the accounting profession have been changing, business and employer requirements for accountants' abilities have been changing. In addition, Industry 4.0 puts accountants in new situations and they face new problems: to quickly master the specifics of digital technologies, to provide for reliability and security of information, to manage risks, etc. The accounting profession is one of those directly affected by the process of rapid digitalisation and they need to keep up with the changes in the world.

The role of the professional accountant in business at present has been undergoing a dynamic transformation and it will continue to undergo major changes in the future. Traditionally, accounting has focused on financial reporting and operational control. Today, expectations has been changing with a greater emphasis on adding value to the organization. The emphasis in the work of professional accountants has been shifting from providing for data and results to interpreting information and contributing to decision-making activities. Accountants have been increasingly involved in the analysis and formulation of decisions on strategically oriented issues.

Much of this change is due to the impact of technology on the profession. The automation of routine, repetitive tasks and operations has freed up time for the accounting team to focus on activities of higher added value. This, combined

with the adoption of a more strategic perspective, enables professional accountants to increase their contribution to the creation of significant value for the enterprise and assume the role of a strategic business partner within the organization.

The transformations in the accounting profession under the influence of digitalization are many and varied. On the one hand, there is a trend of decreasing demand and cutting jobs (World Economic Forum, 2020, p. 30), with accountants and auditors being in the top 5 job positions with decreasing demand. This fact, combined with the tendency for machines to displace people in a number of operations and processes, leads to serious concerns on the part of accounting personnel. On the other hand, during and after the COVID pandemic, the opposite trend has been also observed. COVID-19 has affected almost every business, including the non-profit sector. As businesses embrace urgent digital transformation and workforce continuity, their leaders have been turning to accountants for support. The words of a CEO sum up the described trends: “healthcare workers are on the front line to save lives and accountants are on the front line to save livelihoods” (Prinsloo, 2020).

### ***1.2. Areas of digitalization in the accounting activity***

The issues related to the digital transformation in accounting are the subject of a number of scientific and empirical studies.

According to V. Lazarova (Lazarova, 2020, p. 11), the specificity of digitization and digital transformation in accounting is related to the following: uniformity of the main systems used in the company; improved data granularity; assessment of the quality and accuracy of the underlying data; real-time reporting; complex big data analytics; extension of interfaces to external systems; automation of routine processes.

F. Filipova (Filipova, 2020, p.106–107) points out that through new digital technologies and their applications, an opportunity is created, accounting information and other data (structured and unstructured), important for forming the overall picture of the activity of companies, to be extracted, processed, analysed, visualized and exchanged between stakeholders. The digital transformation of accounting is expressed in the implementation of the following technologies (Filipova, 2020, p.106–107): electronic business (E-Business), including blockchain technologies; cloud technologies (Cloud Computing); ERP systems (Enterprise Resource Planning Systems); new applications of digital technologies, through which information related to more complex accounting, financial and tax objects is created, processed and analyzed; electronic reports with open access standards (XBRL), which is the direction in which the way of publishing corporate reports has been developing.

The prominent author in the field of accounting Raef Lawson (Lawson, 2020) considers the great opportunities that the implementation of technology provides to improve the way business is conducted and emphasizes the technology that impacts the financial and accounting processes. Some of them, which R. Lawson dwells on in more detail, are: artificial intelligence (AI), Big Data, business intelligence/data analytics; chatbots, cloud computing, data visualization, digital assistant, machine learning, virtual reality, robotic process automation (RPA), intelligent process automation – a combination of the application of robotic process automation and AI that helps to complete work more efficiently.

Lawson summarises: „This is the way of the future. As management accountants, we need to look forward to the opportunities new technology can bring to our companies. Finance organizations that fail to adopt appropriate technology will risk becoming irrelevant as they fall behind the rest of the organization“ (Lawson, 2020).

According to G. Kogan (Kogan et al., 2021), the two most popular techniques for accelerating routine financial and accounting processes are *robotic process automation (RPA)* and *self-service data analytics*. Organizations that strategically deploy both tools in their finance and accounting functions have the opportunity to better structure manual processes into more robust, accurate, repeatable and easily auditable processes. Additionally, organizations that use process automation to improve efficiency can free up capacity to focus on performing more analytics of added value and on driving innovation. All this, in turn, contributes to achieving a competitive advantage. Financial professionals, including accountants, can benefit from acquiring novel capabilities to streamline manual processing in their organization and realize benefits in terms of process control and efficiency.

According to Gartner (Gartner, 2020), by 2024, large organizations will triple their capacity to perform automation of various processes. And according to a Business Wire<sup>3</sup> report, by 2027, the global process automation market is expected to grow to \$25.6 billion, at a rate of 40.6% annually.

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<sup>3</sup> The title of the report is Global Robotic Process Automation Market Size, Share & Trends Analysis.

## **2. A study of the practice regarding the implementation of technology in accounting**

### ***2.1. Empirical research on the practice in the USA and European countries***

In his 2020 study of the US accounting practice, R. Half (Half, 2020) highlights the impact of technology on traditional finance jobs. Some of the technologies that have been fundamentally changing accounting are: robotic process automation (RPA); natural language processing (NLP); machine learning (ML) and artificial intelligence (AI). R. Half emphasizes the fact that nowadays more and more organizations have been turning their attention to artificial intelligence (AI) and trying to identify areas of its application in the financial sphere. According to his research (Half, R., 2019), about a quarter (24%) of accounting and finance functions in the United States are already using the technology, 29% expect to use AI in the next three years, and 26% do not expect to use AI in the next five years. The author sees the current capabilities of AI in the following: automatic generation of documents, including contracts; performing real-time analysis and then producing written reports; managing compliance and fraud prevention controls; data mining to find new business opportunities.

In 2022, KPMG (KPMG, 2022) investigated the processes of digitization of accounting by studying the practice in Germany (for the sixth year in a row) and in Austria and Switzerland (for the third year in a row).

The subject of in-depth analysis in this publication is KPMG's empirical research and the possibility of comparison with previous years, which give a clear picture and a more detailed view of which technologies and systems are relevant to the accounting practice, and also which accounting processes have been digitalised and to what extent the digitalisation of non-financial reporting has been developed. The KPMG research itself runs from 2017 to the present, the focus and attention of this article being on the last three years. The aim is to present an up-to-date and comprehensive picture of the current state of digitalisation in the field of accounting. *This information is generally significant for determining the need accountants to possess specific future knowledge, skills and competencies.*

In 2020, over 2,500 companies from Germany, Austria and Switzerland were invited to participate in the KPMG online survey. Of these, 331 companies actually participate - 38% from Germany, 42% from Austria and 20% from Switzerland. CFOs and chief accountants (28% and 48% respectively) were interviewed in the survey. In 2021, more than 2,500 companies from Germany, Austria and Switzerland were again invited to participate in the online survey. Eventually, 350 companies from Germany, Austria and Switzerland took part –

46% of the companies from Germany, 48% from Austria and 6% from Switzerland. Mostly CFOs (33%) and chief accountants (36%) participated in the survey. The 2022 survey involved 131 companies from Austria and 300 in the entire DACH region<sup>4</sup>.

The KPMG surveys investigated the application of the following technologies: artificial intelligence (AI), big data, blockchain technology, in-memory databases<sup>5</sup>, machine learning, neural networks<sup>6</sup>, robotic process automation (RPA), virtual reality, business process management (BPM) platforms<sup>7</sup>.

In this publication, the authors systematize the most important conclusions from the empirical studies from the three years. These findings are listed in Table 1.

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<sup>4</sup> DACH region refers to three Central European countries. It is an acronym that stands for D- Deutschland, A- Austria and CH- Confoederatio Helvetica (Switzerland's official name in Latin), <https://worldpopulationreview.com/country-rankings/dach-countries>

<sup>5</sup> With an in-memory database, the data is stored primarily in the main memory and not on a hard disk., which allows for a significant speeding up of data analysis.

<sup>6</sup> Neural networks are a way to implement machine learning systems through simulations.

<sup>7</sup> BPM allows for implementing and managing business processes by streamlining workflows using business applications.

Table 1.

***Status and degree of digitalisation of specific technologies in the accounting practice***

<b><i>Areas of digitalization in accounting</i></b>	<b><i>2020</i></b>	<b><i>2021</i></b>	<b><i>2022</i></b>
<p>1. <b><i>Homogenisation of systems, management of master data quality, paperless accounting</i></b></p>	<p>Homogenisation of systems, management of master data quality, paperless accounting are the main corporate areas of digitalisation. The main focus is on the homogenization of the main systems used in accounting and data quality management. In 71% of surveyed companies, accounting is already paperless or is about to - this is an increase of 9% points compared to the previous year.</p>	<p>Digitization is constantly being implemented in the core of accounting processes. There are different rates of development for implementing the basic aspects of digitization. However, the homogenization of the core systems, the improvement of the quality of the core data, and the introduction of end-to-end paperless processes continue to be the main focus.</p>	<p>They are widely used everywhere: the homogenization of systems, followed by the management of the quality of basic data and the abolition of old systems.</p>
<p>2. <b><i>Cloud technologies and BPM platforms</i></b></p>	<p>Companies are still reluctant to use new technologies. Cloud technologies are used only in pilot projects by almost half of the study participants. Little interest is observed in the use of BPM (Business Process Management) platforms for the automation of financial processes, although the standardization of work flows is a pillar of digitalisation for companies.</p>	<p>Cloud technologies are a leading trend among all new technologies. The majority of the respondents use cloud solutions in all areas or at least in some sub-departments.</p>	<p>There is a constant growth of cloud technologies, rapid development of in-memory databases, self-service reports and business process management (BPM) platforms</p>
<p>3. <b><i>Standardisation of workflows</i></b></p>	<p>The central goal is the standardization of the processes related to the transition to a new ERP system.</p>	<p>The full digitalisation of operational business processes continues to be a major focus in the surveyed companies. The standardization of processes and their digital mapping in the ERP system or other digital tool is also a central aspect of digitalisation. At the same time, changes are being made in the structure and organization of the processes.</p>	<p>The biggest challenges in implementing digitalization initiatives are above all the management of the quality of the basic data, the standardization of workflows and the limited human resources for the projects (in addition to the day-to-day business) and the difficult circumstances due to the situation with the pandemic of COVID.</p>



4.	<b>Digitalisation of basic accounting</b>	Compared to previous years, there are many clear progress in abolishing legacy (outdated) systems and introducing electronic documents.	Digital invoices replace paper ones. More and more companies are using paperless solutions in the digitization of the process from purchase to payment. Scanning and optical recognition solutions, as well as digital purchasing and sourcing platforms, have taken hold to a significant degree in companies to enable digital reflection of this central accounting process end-to-end.	The process of introducing paperless solutions continues at an accelerated pace.
5.	<b>Non-financial reporting</b>	To a large extent, non-financial reporting is not supported by the system.	Non-financial reporting remains an obstacle to digitalization efforts in the studied companies. Many of the respondents believe that there is still a lack of standardization and quality of non-financial data, which often leads to delays in the digitalisation of this information. In this very important new area of reporting, many regulatory requirements are still not clearly defined and understood.	There is an increase in attention to non-financial reporting in connection with the EU requirements for sustainability reporting coming into force in 2024. When assessing the degree of digitalisation, an increase is noticeable compared to the previous year. While in 2021 about 25% assessed the degree of digitization as 50% or higher, now about 29% of respondents do so.
6.	<b>Blockchain technologies</b>	Blockchain still does not play a role for the majority of companies.	The topic of blockchain does not play a major role in the digitalization of accounting, as well as the use of BPM platforms.	Interest in blockchain is still small.
7.	<b>Artificial intelligence</b>	The use of AI in most areas of accounting is still very limited. Respondents fails because of outdated systems and databases.	Little interest in the application of AI.	There is no significant progress in the use of AI.
8.	<b>Virtual reality</b>	Limited interest in virtual reality.	Weak interest in virtual reality.	Weak interest in virtual reality.
9.	<b>Cyber security</b>	-	-	Serious attention is paid to cyber security and authorization - over 75% indicate that cyber security in accounting is important.
10.	<b>People as a key factor for the digitalization of accounting</b>	-	-	People are considered to be a key factor for the digitalization of accounting

Source: The Authors (based on data from KPMG 2020, 2021, 2022).

The studies for all three years outlined six priorities in the digitalization of accounting processes, namely:

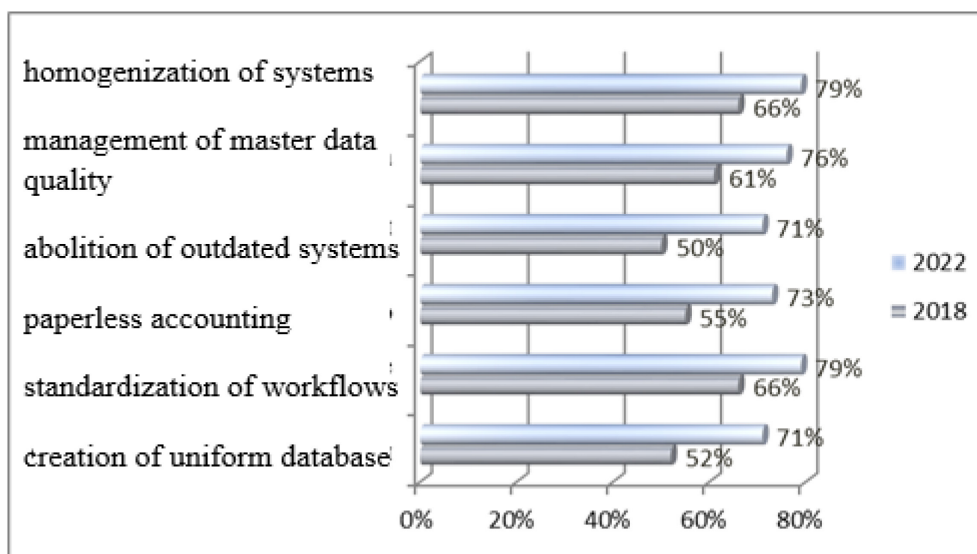
- ✓ Homogenization of the systems;
- ✓ Paperless accounting;
- ✓ Standardization of workflows;
- ✓ Master data quality management;
- ✓ Creation of uniform database;
- ✓ Abolition of legacy (outdated) systems.

The above six key areas of digitalization of accounting processes allow systematization of the following conclusions and summaries:

- For 2020 (KPMG, 2020), homogenization of systems has made the most progress (29%), followed by removal of legacy systems (18%). For projects that have already been implemented or are being implemented in some areas, most of the replies refer to the standardization of workflows (61%) and data quality management (58%). Nearly a quarter (24%) of participants are planning to create a uniform accounting database.

- For 2021, the responses show that the homogenization of systems has already been implemented everywhere (24%), followed by the abolition of legacy systems (18%) and the introduction of paperless accounting (16%). In the case of projects that have already been implemented or are in the process of implementation, most of the responses are related to the standardization of workflows and data quality management, both of which are 60% (KPMG, 2021, p.11).

- For 2022, the results (KPMG, 2022) show that homogenization of systems has already been implemented "nationwide" - (33%) and "at least in some areas" - (29%), followed by master data quality management - "nationwide" - 24% and "at least in some areas" - 31%. The next place is occupied by the removal of legacy systems "nationwide" - 21% and "at least in some areas" - 28%. For projects that have already been implemented in some areas or are in the process of implementation, the standardization of workflows (60%) and the creation of a unified database (59%) are most often mentioned. This focus corresponds to the results in the DACH region, where a similar distribution can also be seen.



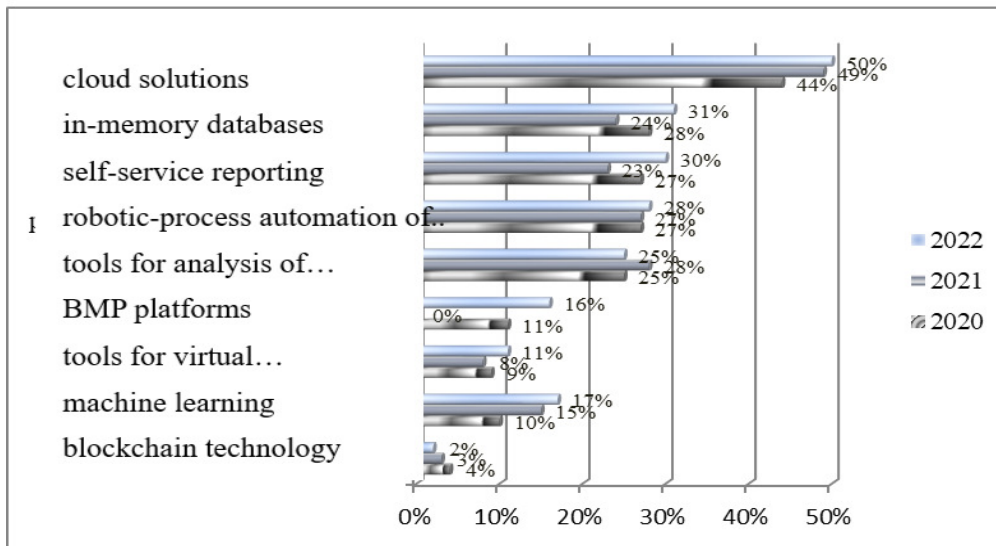
Source: KPMG (KPMG, 2022, p.12).

*Figure 1. Advancement in digitalisation: comparison between 2018 and 2022*

Size of sample: for 2018 г. n=172, for 2022 г. n=300

Most of the companies recognize the added value of these technologies, but introduce them gradually. One of the reasons is the lack of adequate resources and the necessary IT know-how, which must be upgraded step by step. The companies are extremely selective in their choice of new technologies and in terms of their focus on them. Furthermore, due to the rapid pace of development, it is clear that companies are having difficulty undertaking a full adoption of all these technologies. With minor deviations, these results are identical to the results for the DACH region.

The companies that have already taken steps to implement digitalisation in the six areas highlighted above were also asked about nine more technologies or technology-based solutions in accounting, namely: cloud solutions, big data analysis tools, automation of processes (software bots/chatbots), in-memory databases, self-service reporting, artificial intelligence, business process management (BPM) platforms, virtual reality tools and blockchain technology.



Source: KPMG (KPMG, 2022, p.15).

Figure 2. Comparison of results with the 2020, 2021, and 2022 surveys.

### Implementation of technology trends

Sample size: for 2020 n=311, for 2021 n=350, for 2022 n=300

## 2.2. Conclusions and generalisations

The significant conclusions that can be drawn are that there is a constant growth in the application of *cloud technologies, in-memory databases, self-service reporting, and platforms for business process management (BPM)*. On the other hand, the interest in technologies such as virtual reality tools, blockchain technology, and artificial intelligence is minimal and shows no upward trend.

The empirical study of KPMG for 2022 (KPMG, 2022) pays particular attention to *people as a key factor in the company's success*. The collected data show that accounting will change completely in terms of organizational structure as automation, digital, and hybrid collaboration will be clearly integrated. For this reason, some companies are already starting to restructure their organizational structure in the financial field – from a classic structure (such as accounting, control, taxes, etc.) to an integrated functional orientation. This integrated orientation is expressed in specialized organizational units in the form of outsourced shared service centers to deal with transactional issues (at

best highly digitalised or strongly automated), as well as "Centers of Competence" or "Centers of Excellence" that perform analyses and interpretations of data and act as business partners in various business areas. Additionally, some companies establish targeted centers of competence for current development of comprehensive accounting methods and standards. It is also evident that there is a stronger correlation between internal accounting (controlling, management accounting) and external accounting (financial accounting). However, the respondents do not fully agree whether there will be a full merger ("One Finance") or both directions will continue to exist but integrated to a higher degree (KPMG, 2022, p.39).

The authors of this study outline **three directions** in which technologies are helping accounting teams move towards modern accounting and effectively carry out their tasks in the digital world. They combine elements from other areas and processes listed above. These directions are:

- *Implementation of continuous accounting* - transforming accounting records into real-time reports. In this direction, the following empirical research can be cited. A study by Gartner (Boyle, 2021) shows that 72% of companies plan to use cloud storage for financial applications over the next three years. Data from The Hackett Group (Boyle, 2021) evidence that more than 70% of financial organizations that have adopted "cloud-based" solutions have met or exceeded their business expectations. It is important to emphasize that achieving continuous accounting requires overcoming other problems such as achieving system consistency, automating routine processes, paperless accounting, etc. Effective implementation of *continuous accounting* requires a holistic approach that combines technologies, processes, and specialists to achieve continuous improvements in the accounting of the organisation.

- *Transferring of the burden of accounting specialists to providing in-depth business analytics* – free from the task to perform routine manual operations, accounting specialists have the opportunity to spend much more time on analysis. The demand for financial specialists who can interpret data continues to grow. McKinsey (Boyle, 2021) predicts that between two and four million jobs created over the next decade will involve interpreting machine information, and the demand for such specialists is expected to far exceed the number of qualified specialists. As accounting specialists provide more in-depth business analysis, they can have a more active role and better manage risk, identifying it in the early stages.

- *Accounting perceives business partnership* - partnership between business and accounting has been discussed for years. However, the large number of routine tasks requires significant, if not comprehensive, effort and time. When the business turns to accounting and finance for support and timely information on key financial indicators, it needs that information to make

decisions now, not after the end of the reporting period. In the virtual world, full of uncertainty, to get timely and accurate data from accounting is essential, as business decisions have a significant impact on the future development of companies. With the rise of technology and the need for intelligent data analysis, financial-accounting specialists are in a unique position to provide valuable forecasts for the future of the business. The leading organizations find a balance in the role of accounting in relation to the application of technology, which brings benefits for business partnership.

### **Conclusion**

The implementation of new technologies in accounting brings many benefits for the future, but also poses many risks. That's why KPMG's empirical study for 2022 (KPMG, 2022) pays particular attention to risks regarding cybersecurity and how they are treated in accounting. R. Lawson also emphasizes the risks of implementing new technologies. Accounting for the challenge of implementing new technologies, a recent Gartner report notes: "On the one hand, financial leaders must recognize the potential for effective financial transformation using advanced analytics, machine learning, and artificial intelligence. But, on the other hand, it is important to keep in mind a sober truth: the path to ML and AI nirvana is littered with the corpses of failed implementations" (Van der Meulen, 2019).

And yet, everything comes to the skills and expertise of accountants. As indicated in KPMG's 2022 study, "...employees need to continue to be technically proficient. Our experience to date shows that AI will definitely not replace people" (KPMG, 2022, p. 40).

In Deloitte's report "Pivoting to Digital Maturity: Seven Capabilities Central to Digital Transformation," it is noted: "Digital transformation is about more than implementing discrete technologies. Rather, it requires developing a broad array of technology-related assets and business capabilities" (Deloitte, 2019, p.2).

The efficient implementation of technology in accounting requires synergy between the execution of specific financial and accounting processes and the use of new technological capabilities. To achieve such an effect in the field of accounting, the human factor is of decisive importance. In this regard, finding a balance regarding the role of accounting in relation to the application of technology underpins the successful organizational restructuring of the financial and accounting sphere. The skills and professionalism of accountants are expected to continue to be a key factor in the success of companies in the

context of digitalisation. Therefore, it is of particular importance to make efforts to upgrade them in unison with the new digital challenges of the modern world.

In summary, digitalisation is dramatically changing financial and accounting processes, and hence the future of the accounting profession. However, the results show that specialized literature focuses mainly on certain technologies (blockchain, artificial intelligence, machine learning), while empirical research reveals that other are used in practice (system homogenisation, paperless accounting, cloud technologies, etc.). Differences have also been found between the accounting practices of the United States and the European countries.

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