Marianna Sávai (ed) 2024: Green and Digital Transitions: Global Insights into Sustainable Solutions, Szeged, 10.14232/gtk.gdtgiss.2024.16

The past, present, and future of the accounting profession and its digitalization: Where is accounting going next?

Ervin Denich – Attila Veress – Krisztina A. Sisa – Ágnes Siklósi

The technological development of the past decade has brought about revolutionary changes in our everyday life. We communicate and find information differently than ten years ago. In comparison to this, the changes brought about by networked devices are understated, even in the short term this technological step can be the one which fundamentally changes the lives of individual users and organizations, the production structure, and also business models. It can be said that Industry 4.0 has transformed the global industrial environment, not sparing accountancy either. The accounting profession can be considered to be traditional, in which the rules and principles have not radically changed in the last decade(s). Globalization, increasing regulations, new technological solutions, and innovations have also made an impact on the profession. Therefore, accountants have a significant opportunity to expand their digitized skills and knowledge, but at the same time, the changes also pose a threat to them if they do not understand how they affect the organization. The challenges facing the individual accountant are manifested in the rapid adaptation and necessity of business practices and business processes without sacrificing the basic accounting rules and principles. In our research, on the one hand, the opportunities and risks related to the digitization of the accounting profession are examined, on the other hand, the challenges faced against digitalization are overviewed, and, thirdly, the results of a questionnaire study administered amongst people working in the field and students are reported. Our results highlight that digitization represents both significant opportunities and risks for the future. The most important challenges to digitization can be outlined as follows: the use of big data in accounting and reporting, cloud-based and continuous accounting, artificial intelligence and blockchain technology. In conclusion, it can be said that technological advances and digitization will have a significant impact on the industry in the future as well, which will introduce changes in the education system, and the needs of the users of accounting information will change. These changes will affect the work of accountants, the acquisition and adaptation of new knowledge, and ultimately the quality of accounting reports.

Keywords: digitalization, accounting profession, education

1. Introduction

In recent decades, rapid technological change and development have taken place. Given the exponential growth of technological advances, it is not surprising that many areas of human life are affected by technology. Industry 4.0 has transformed the global industrial landscape, relying heavily on digital software and automation of robotic functions to replace human tasks (Sima et al., 2020). Therefore, digital technology has an impact on a company's strategy, which is nothing more than a commitment to several coherent, mutually reinforcing actions and behaviors to achieve goal-oriented competition (Pisano, 2015). A good strategy promotes

alignment of teams within the organization, clarifies goals and priorities, and helps focus resources (Sadun et al., 2017). A good strategy has clear, explicit and specific objectives that will help the company to achieve sustainable competitiveness and achieve its competitive goals. Competitiveness is defined as the efficient use of resources relative to other firms producing similar products or services (Vörös, 2010). Competitiveness can be effectively measured by indicators expressing competitive priorities such as cost, quality, flexibility, age, and speed of realization of productivity knowledge gains (Krajewski et al., 2013; Vörös, 2009; Vörös, 2021; Mishina–Takeda, n.d.) and the creation of an integrated supply chain (Simchi-Levi–Timmermans, 2021). Competitive advantage in competitive priorities is difficult to replicate, enables firms to achieve sustainable growth, and has an impact on the firm's market perception.

In addition, digital technology has a significant impact on accounting information systems (Mancini et al., 2017). Thus, the accounting profession is no exception to this, as its evolution can be broken down into five "technological stages": traditional manual, mechanized, automated, robotized, and artificial intelligence-assisted accounting (Bakulina et al., 2020). Technological advances and digitalization allow the accounting profession to be updated and changed. The development of modern computer systems leads to a reduction in the workload of accountants. Accounting professionals seem to be receptive to the idea of automating relatively minor and repetitive tasks because IT infrastructure allows them to take on more important tasks (Andreea et al., 2021).

Technological developments, globalization and increasing competition are forcing the industry to change constantly. The accounting profession is at the forefront of the professions that are and will continue to be most affected by technological developments and globalization. It is evident that with technological advances, many digital systems are being used that did not exist in the accounting profession ten years ago (Tekbas, 2018). According to the results of research conducted by Frey and Osborne (2017), 702 jobs are threatened by automation, and the accounting profession is at the top of the list, with a high probability of being automated and digitized in the near future already.

The aim of this study is to examine the opportunities and risks associated with the digitization of the accounting profession, the challenges facing the accounting profession, and the results of our questionnaire survey of accounting professionals and students studying accountancy.

The second section presents a literature review of the development of accounting. Subsequent sections describe the research methodology, results, and, finally, present the conclusions.

2. Literature review

From the humble bean counter to the most advanced supercomputer, the history of accounting has been in tandem with the development of humankind, and has to willingly embrace the changes required.

2.1. The evolution of accounting

2.1.1. Ancient times: the beginnings

Accounting has been part of human life almost since the beginning of time. To understand the modern face of accountancy, we need to look to the past and follow the evolutionary journey.

The emergence of accounting dates back to ancient times and can be traced back to Mesopotamian agriculture. According to researchers, accounting records were used in agriculture as early as 3500 BC to record the annual quantities of grain, bread, and beer. These records were carved on clay tablets in the cuneiform script used in Mesopotamia. The tablets were stamped with a seal that corresponds to the current signature. It can, therefore, be said that accounting is as old as writing. It is probable that the tablets with numbers and writing found during the excavations contain the accounting records of the time (Sztanó, 2019).

According to the findings of excavations, the next main stage in the world of accounting can be traced back to the Babylonian period in Egypt in 3000 BC. The Egyptian accountants of the time kept a record of the treasures of the pharaohs, the property of the church, and the treasury on papyrus scrolls. Their work was particularly significant, as any error detected in royal auditing could have serious consequences, such as mutilation, or in more serious cases, the death penalty (Harford, 2017).

There is also evidence from the 5th century BC that suggests that there were people responsible for the logistical tasks of the Attic confederation, who had to settle the accounts of the treasury of the Attic confederation and pay the tithes to the goddess Athena Pallas (Sztanó, 2019).

In ancient Greece, coinage became widespread in the 7th century BC. Bartering caused various difficulties, as the needs of bartering merchants were not necessarily met on the market, and to overcome this difficulty, commodity money was introduced.

The emergence of commodity money coincided with the emergence of banks and banking services. Bankers kept books of accounts, changed money, lent money, and organized cash transfers for citizens. In this way, citizens from one city could transfer money to each other through the bank of another city (Sztanó, 2019).

2.1.2. From middle age to the threshold of automation

The next milestone in the world of accounting came in 795, during the reign of Charlemagne, King of France. The first balance sheet is attributed to him, since in 795 he laid down a legal framework for the royal chancellery to draw up a year-end balance sheet, for which a sample balance sheet was drawn up within a given framework. This was effectively the equivalent of a property register (Sinka, 2014).
The first evidence of the emergence of double-entry accounting is the Genoa ledger from 1340. In these ledgers, the revenues and debts of the state were recorded, and already in this ledger, tax debts, fines and loans were separated, which clearly resembles the current appearance of double-entry bookkeeping (Sztanó, 2019).

At the beginning of the 13th century, Venetian merchants were already keeping records of their economic activities. These records are practically the equivalent of today's single-entry bookkeeping. As trade developed, so did the need for detailed records. It was then that double-entry bookkeeping in the records that were kept developed (Sztanó, 2019).

Double-entry bookkeeping is still associated with the Venetian monk Luca Pacioli, the father of accounting, who in 1494 was the first to write down a unified summary of the information known about double-entry bookkeeping in his *Summa de Arithmetica Geometria, Proportioni et Proportionalita.* The last chapter of the book deals with accounting and is entitled 'Double-entry bookkeeping and written documents'. In it, the monk described the rules of double-entry bookkeeping and the basics of drawing up balance sheets (Barancsuk, 2016).

Although we call Luca Pacioli the father of double-entry bookkeeping, it is significant that Benedetto Cotrugli was the first to write about bookkeeping in 1458, but his book was not published until 1573.

Both the fifteenth and sixteenth centuries saw an exponential increase in trade, leading to new demands being imposed on the methodology of bookkeeping. A business economics approach became important, including the calculation and monitoring of costs, which could be tracked mainly through statistical calculations (Sztanó, 2019).

With the development of legislation, accounting rules have also evolved. First, in 1794, Prussia's General Law of 1794 introduced compulsory balance sheets, with strict consequences for failure to keep them (Sinka, 2014).

As the General Law reads, "A trader who either fails to keep proper accounts or fails to prepare a balance sheet, which is required to be drawn up at least once a year, and thus fails to know his own position, will be punished as a negligent banker in the event of insolvency" (Sinka, 2014:1).

In Hungary, Act 37 of 1875 on Commerce required the preparation of balance sheets and inventories. Subsequently, in 1925, a decree of the Minister of Finance (Decree 7000 of 1925) was issued, which included the issues of the authenticity of the merchant's balance sheet.

In today's digitized world, it seems almost inconceivable that relatively not so long ago our accounting predecessors used transcription techniques to copy invoice entries into diaries. These were then known as ledger files. In practice, the transcription technique was to place the journal on a metal plate (*evolutra*) and then transcribe the ledger book using carbon paper, which was placed over the sheet with a paper clip. This technique made it possible to carry out both the accounting process in sequence and the time-series accounting process.

On January 1, 1947, the first compulsory chart of accounts was introduced in Hungary. Until then, there was no single compulsory account numbering system in Hungary.

In 1954, a decree of the Minister of Finance was issued, which defined the content of the balance sheet of companies. It stated that the main purpose of accounting was to measure and report detailed information on the fulfilment of plans (Sztanó, 2019).

2.1.3. The transformation of accounting in the wake of digitalization

Later, this process was automated, mainly by using typewriters, and, with the advent of computers, automatic bookkeeping machines. At that time, they were still very rudimentary manual-mechanical devices, but soon afterwards, devices with electromechanical transmission appeared (Sinka, 2014).

We can see how many centuries it took to develop the accounting service as we know it today. Paper-based bookkeeping has now been almost completely replaced by the computer, as the recording process, returns and reporting are all completely electronic, and today, contacts with the various authorities are almost exclusively online or by telephone.

2.2. Digitalization

The work of accountants has evolved in line with the development of information technology (Granlund–Mouritsen, 2003), with accounting information and technology hav[ing] been linked from the beginning. The literature describes two phases of technological development that have an impact on organizations.

The first stage of technological development that significantly changed the work of organizations and accountants was the emergence of computerized information systems (Porter–Heppelmann, 2015). These systems, which were introduced in the 1960s and 1970s, enabled accountants to record data in greater detail and produce more accurate analyses. The second phase was mainly characterized by the emergence of the Word Wide Web and integrated information systems (IIS) (Porter–Heppelmann, 2015). In this context, integrated information systems support management accounting (Rom–Rohde, 2007). In the late 1990s and early 2000s, integrated information systems, including ERP systems in particular, were a fashionable topic in IT. These ERP systems enabled accountants to provide and obtain information from within the organization in a much more efficient way than before.

A third phase of technological development is now emerging. The combined emergence of many technologies has had a major impact on the way organizations work, including the work of accountants. This third phase is typically referred to as 'digitalization' (Karimi–Walter, 2015; Parviainen et al., 2017).

Digitalization should not be confused with digitization. The latter refers to the technical process of encoding analogue information into a digital format, making digitized content programmable, addressable, traceable, and communicable (Hylving–Schultze, 2013; Yoo et al., 2010). As such, digitization is a less comprehensive change than digitalization. On the other hand, digital transformation entails significant organizational changes driven by digital technologies and, therefore, profound changes in both strategy and business management (Fitzgerald–Kruschwitz, 2013). Digitalization involves more than a mere technical process but does not necessarily entail a reconfiguration of strategy or a fundamental change in business management. However, digitalization is associated with important changes to sociotechnical structures (Yoo et al., 2010). These structures are being transformed by challenging underlying assumptions about the design and use of digital technologies (Thorseng–Grisot, 2017).

The concept of digitalization is also found in paragraph 2 of Government Decree 451/2016 (XII. 19.) of the Hungarian government, which states that digitalization is "a process that transforms analogue information into digital information that can be processed by computer equipment".

Digitalization in the field of accounting can, therefore, be defined as the replacement of the paper-based submission of tax returns by data submission via a client or company gateway. This has not replaced the human factor but facilitated the workflow by allowing the computer to encode and transmit information in electronic form rather than by mail. Automation is when technology replaces human resources, thus replacing the human involvement in the work process. In a way, automation creates value, because while in digitalization the computer adds little or no value, in automation the value added is high.

Digitalization is the use of digital technologies to change a business model and create new revenue and value opportunities, a shift to digital business (Gartner Glossary n.d.). It means transferring more responsibility to Internet-related software applications. With the drive to digitize the accounting profession, the accounting industry is undergoing a transformation (Duong–Fledsberg, 2019). A number of digital technology developments is available to meet the requirements of different business models.

2.3. Digitalization of the accounting profession

The accounting profession is both growing and evolving. Thanks to technological advances and changing consumer expectations, the workforce of accountants is expanding. As a result, the accounting profession needs to adapt more to technological advances and digitalization, as the accounting profession now uses automated systems that did not exist ten years ago (Tekbas, 2018). With the implementation of digitalization in the accounting profession, the work of accountants has changed radically and is increasingly dependent on modern equipment and advances in technology.

Digitalization has also changed the way people think and practice accounting (Fettry et al., 2018). As the accounting profession adopts technology, the number of jobs for accountants with programming and analytical skills is expected to decrease. Therefore, it is necessary and desirable for firms to provide adequate retraining for current employees (Zhang et al., 2020). Proper training not only boosts employees' confidence but also improves their understanding of their tasks, as well as of the information and skills needed to perform their duties.

2.4. Main digital solutions for accountants

2.4.1. Artificial intelligence

"Industry 4.0 describes the organization of production processes in which devices communicate autonomously with each other along the value chain: creating a 'smart' factory of the future in which computer-controlled systems monitor physical processes, create a virtual replica of physical reality and make decentralized decisions based on self-organizing mechanisms" (Smit et al., 2016:23).

The rise of smart technologies such as artificial intelligence and machine learning are bringing near real-time information to businesses. Artificial intelligence and automation can significantly reduce the need for human labor and can be integrated into accounting and auditing processes. Artificial intelligence can be successfully applied to more structured, programmable, and repetitive tasks, where human knowledge and expertise are not too difficult or demanding to gather (Moudud–Ul-Huq, 2014). Smart technologies are not being developed to replace human intelligence but to help accountants become better strategic advisors. Artificial intelligence and machine learning enable accountants to better access a wide range of real-time information while considering multiple sources.

2.4.2. Blockchain

Blockchain is another trend in the financial and accounting field. A blockchain is a digitalized ledger that records transactions without the involvement of a financial intermediary (Dai–Vasarhelyi, 2017). A blockchain contains the repositories called "blocks" in which data is recorded. Each block acts as a real-time ledger. Each block stores all the information about the previous transaction, and when the block "completes", it joins the next block and passes on the available information. Therefore, blocks are closely related to each other and have security specific information about the previous block. Blocks are connected in a linked chain, and therefore this technology is called blockchain (Fanning–Centers, 2016). This system is decentralized, so that all parties involved in a transaction have access to the blockchain, where they have the possibility to read, check, update and publish new transactions in the blocks.

One of the advantages of blockchain is that it can be a good way to prevent fraud, as changes within blocks are extremely complex. Another advantage is that the two parties involved in the transaction can send and receive the invoice through the blockchain, as well as have the option to repay the invoice through the blockchain system, which makes the transaction process faster and paperless, preventing missed invoices (Fanning–Centers, 2016).

According to Alarcon and Ng (2018), there are insufficient tools to control the system and ensure that it works as promised, leading to low system reliability. Yeoh (2017) observed that there is still a lack of standards in this area of technology. According to Partida (2018), a barrier to blockchain is the lack of expertise and of professionals who can manage the system.

2.4.3. Continuous accounting

Technological progress offers new opportunities for the daily provision of information. Accounting continues to be based on periodic review and analysis of financial information, but stakeholders, auditors and other partners with close links to the business expect comprehensive and real-time reporting. A transition period and implementation steps will be needed to introduce and move from a periodic accounting and reporting system focused strictly on financial information to a more comprehensive review of accounting reporting. The implementation and transition to

a more comprehensive accounting function will result in some shift in current roles (Smith, 2018).

2.4.4. Big data

According to Rezaee and Wang (2017), big data has been increasingly used in finance and accounting over the past decade. Big data is an enormous data set of great size that cannot be analyzed manually or with old traditional accounting software. In addition, big data is composed of structured and unstructured data, which makes it difficult to use traditional accounting software to analyze it (Warren et al., 2015). Big data can be divided into four dimensions, which can be called the four Vs: volume, variety, velocity, and veracity. Each dimension represents a different claim. Size refers to the large volume of data, variety to the diversity of data types, velocity to the speed of data generation, and veracity to the reliability of data (Syed et al., 2013).

Richnis et al. (2017) argue that as big data is developed through the accounting function, accounting processes would be automated, but despite this, the role of the accountant would remain significant, the accountant position would not disappear, instead a more labor-intensive accountant role would take over, managing the interpretation and analysis of financial data. Accountants already know and understand the business processes and have worked with data in the past, so the accountant role remains important.

In addition to the benefits of big data, it is important to talk about its drawbacks and risks. According to Payne (2014), the main disadvantages of big data for companies are data privacy issues on the one hand and cybersecurity issues on the other, which can lead to unethical use of data. In addition, as big data becomes more widespread in the use of accounting, the accounting profession will need more knowledge and skills to adapt to technological changes. Griffin and Wright (2015) argue that the adoption of big data in the accounting profession should be most prevalent among academics and educators, where no specific curriculum has been developed to prepare students for the new technological changes. Accountants should, therefore, know how to analyze and use databases, and, more specifically, how to use big data analysis tools.

Overall, for accountants to continue to add value to the business, they need to learn new skills in artificial intelligence and other digital solutions in the modern business environment. Accountants need to develop critical thinking and problem-solving skills, and focus on high levels of adaptability, flexibility and interpersonal interaction. Prospective accountants need a range of skills for a successful career, including motivation, good written and oral communication, decision-making, financial analysis, and professional judgement. Education also needs to change, with the education system changing to focus on critical and systems thinking to develop students' creativity. Accountants will have a major pro-active role in running the business of the firm and will need to work with other staff in other functions.

3. Method and results

Both induction and deduction methods were used in our study. As external observers, we tried to capture the subject of the study – the opportunities and risks associated with the digitalization of the accounting profession and the challenges facing the accounting profession in the face of digitalization. At the same time, human beings, as cognitive subjects, cannot completely separate themselves from the object and exclude themselves from the picture of the object. Our cognitive tools, both material and intellectual, are always human tools, and a human is always a person of a certain age and society.

In our work, we have chosen the research methods to be applied in order to answer the research questions. To identify the opportunities and risks related to the digitalization of the accounting profession and the challenges facing the accounting profession in the face of digitalization, it became necessary to review and analyze the literature. The picture that emerged from the secondary information helped to delimit the scope of primary and secondary information needed for the research.

Furthermore, due to the practical nature of our research topic, the methodological background of the study is mainly provided by the application of primary research methods. In order to answer the research questions, the questionnaire survey method was used, using an online questionnaire. When selecting the target group, we considered it important that the current situation, challenges and experiences of the profession are expressed by professionals who are personally involved and have relevant experience, therefore the online questionnaire was shared on the websites of professional communities, platforms, and groups, and we also directly involved relevant participants in the practical research using our own professional network. At the same time, we also examined the impact factors related to digitalization from the perspective of students who are studying accounting.

The online format ensured that as many people as possible could be reached quickly and efficiently. Our study summarizes the results of measurements carried out in 2020 and 2022 and includes the results of 1,167 questionnaire surveys completed by accountants in 2020 and 1,070 in 2022.

The sample based on the available valid and assessable responses is approximately 1.5 to 2% of the Hungarian accountancy community (according to the records of the Ministry of Finance, the number of registered accountants exceeded 52,000 in 2023), so the sample can be considered representative, as the proportion is around 2% in public opinion surveys. Furthermore, there was a significant number of accountants from all accountancy sections (small accountancy firms, larger accountancy firms, multi-accountancy firms, and non-accountancy firms) among the respondents.

In our ever-changing world, many people have written and continue to write about the future of certain professions in many different ways. For some professions, such as accountancy, a particularly bleak future has been predicted. In their study, Frey and Osborne (2017) found that, on average, 47% of all occupations in the US and 94% of accountants and auditors' work could be computerized. In 2015, the Wall Street Journal wrote: "The new bookkeeper is a robot" (Monga, 2015:1).

Technological advances, globalization and increasing competition mean that careers are constantly changing (Frey et al., 1999). According to the report, 702 jobs are at risk of automation, and accounting is the most likely to be automated and digitized in the near future. Digitalization can be seen as both an opportunity within the accounting profession and an exposure to risk. If accountants do not understand how technological change and digital transformation will affect their workplace activities, they are putting themselves at risk (ACCA, 2020). Table 1 summarizes the most common digital opportunities and risks.

Table 1. Opportunities and risks related to the digitalization of the accounting profession

Opportunities	**Risks**
Creating new jobs	Job losses
Reduced working hours and greater autonomy	Extending working hours, increasing "anytime, anywhere" working
New forms of cooperation between workers and machines	Weakening worker representation and "bargaining"
Better ergonomics thanks to support during difficult and complex work	Increased competition between workers to reduce costs
Smart jobs: jobs outsourced to low-wage countries are making a comeback	Increasing work, dependence on "data masters" and supervision
More gender equality	Increasing inequality between workers
Sharing economy	Financing the erosion of the tax base and social security

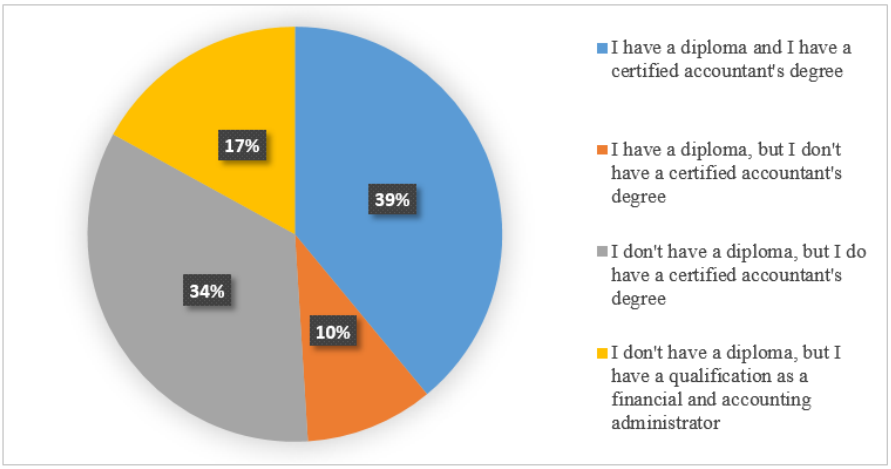
Source: Voss–Riede (2018)

Firms in developing countries are less likely to invest in skills development and innovation activities than firms in developed countries. At the same time, it should not be forgotten that digital capabilities increasingly determine which businesses create or lose value (Hirt–Willmott, 2014). Soon, technological developments and digitalization will have a major impact on the accounting profession (Gulin et al., 2019), and the shift towards digitalization will be a key factor in the success of businesses and the new accounting system. It is therefore necessary to examine the opportunities and risks associated with the digitalization of the accounting profession from the perspective of current and future accountants.

Among the opportunities and risks listed in Table 1, we looked at the location and education of accountants, which has an impact on salaries in addition to the length of time in the profession.

The following tables and figures show the distribution of the 464 Budapest based accountants and 703 accountants from the rest of the country surveyed by qualification, years in the profession, and place of work.

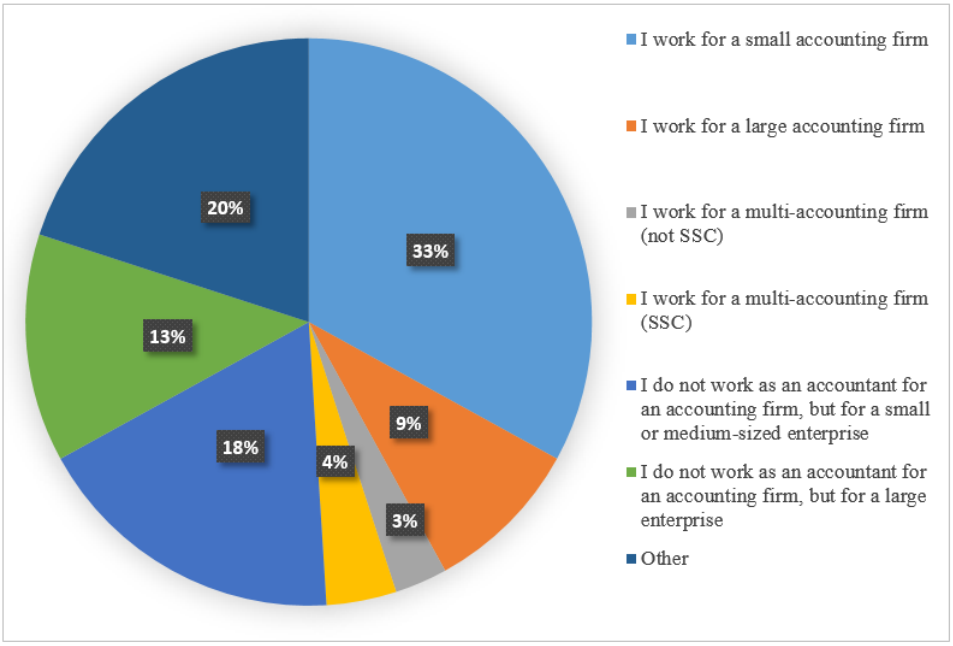
Figure 1. Distribution of survey respondents by education



Source: own construcion

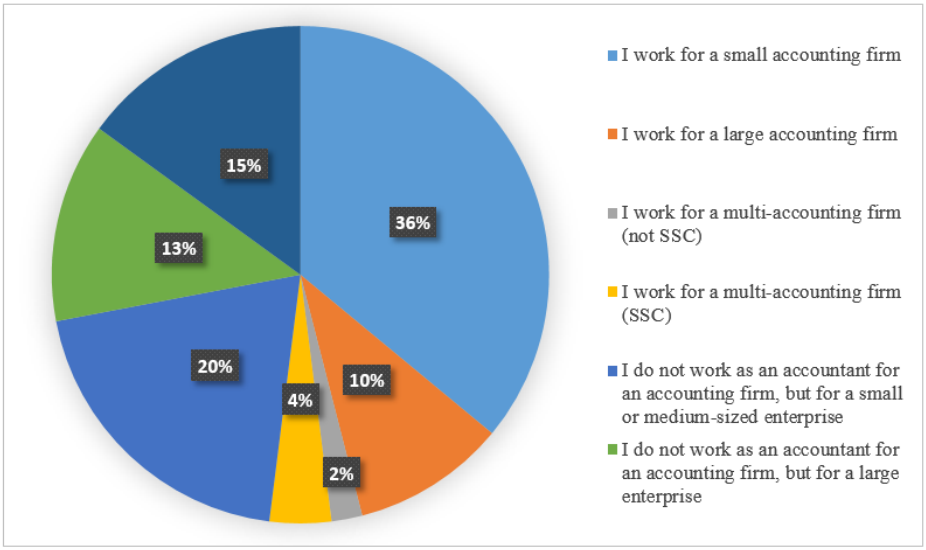
We also looked at the number of years accountants have been in the profession. 37.75% of the respondents have been working in the profession for more than 8 years, 25.38% have 3 to 5 years of professional experience, and only 8.05% are new accountants.

Figure 2. Distribution by place of work in 2020



Source: own construcion

Figure 3. Breakdown by place of work in 2022



Source: own construcion

The results of Figures 2 and 3 show that about half of the respondents work in accounting services firms (small accounting firms, large accounting firms, and multinational accounting firms). About one third of the accountants work in smaller accounting firms, and only 6-7% of the accountants work in multinational companies.

Both the place of work and the length of time spent in the profession affect the evolution of average earnings, which can be either an opportunity or a risk thanks to digitalization, so it is important to examine their evolution.

Income was examined only for full-time accountants and self-employed, other questions were examined for all respondents.

Table 2. Evolution of average gross earnings

Categories	**2020**			**2022**		
	Budapest	Other	Total amount	Budapest	Other	Total amount
early career	312,417	267,656	288,200	410,417	332,237	362,500
1-2 years	361,111	284,091	317,975	454,545	367,647	412,736
3-5 years	420,066	314,762	358,516	495,070	418,116	457,143
6-8 years	496,728	368,487	435,567	621,667	501,923	553,986
more than 8 years ago	566,822	391,460	452,177	677,568	524,740	584,388

Source: own construcion

An interesting comparison can be made by comparing average wages with national average wages. Data from the Hungarian Statistical Office (gross average wage, for full-time employees) shows the following:

- 2020 I-IV quarter cumulative data: 403,606 HUF
- 2021 I-IV quarter cumulative data: 438,814 Ft
- First half year of 2022 cumulative data: 505,272 HUF (www.ksh.hu).

Table 2. shows that salaries in Budapest exceeded the average salaries of rural accountants in both years and in all categories. Compared to the national average, the average salary of accountants with more than 5 years of experience is higher than the national average, but not for those with less experience.

Table 3. Evolution of average earnings by type of employer enterprise

Title (workplace of the accountant)	**2020** Cumulative average*	**2022** Cumulative average	**Change 2022/2020**
In a small accounting firm	329,025	464,831	141.28%
In a larger accounting firm	414,865	485,000	116.91%
In a multi accountancy firm (not SSC)	477,174	787,500	165.03%
In a multi accountancy firm (SSC)	586,290	582,031	99.27%
I do not work for an accountancy firm, but for a small or medium-sized enterprise	432,721	556,753	128.67%
I do not work for an accounting firm, but for a large company	494,575	576,600	116.58%

Source: own construcion
Note: * The cumulative average is the cumulative average of the individual income category for the years spent in the profession

One of the great advantages of an accountancy qualification is that it opens up a number of career paths for those starting out. Qualifications, language skills, and ambitions and plans also play a major role in guiding the choice of career. Table 3 shows that multi-accountancy firms offer the highest salaries in both years, 2020 and 2022. The average salary in SSCs (Shared Service Centers) is almost 600,000 HUF (interesting data on the decrease in average salary), while in other multi firms it reaches almost 800,000 HUF, with a significant increase of 65% from 2020 to 2022. It is important to note, however, that service centers and other multi-companies only expect new entrants with language skills and SSCs only expect accountants to perform sub-tasks related to a specific field in the first years. In multi-accountancy firms, for example, a salary of up to around 750,000 HUF is available after 6-8 years as a team leader. A relatively good starting salary can also be expected if you are not in an accountancy firm but in an SME or a large company in the accounting field. An accountant in a non-accounting small and medium-sized enterprise earned 556,753

HUF and an accountant in a large enterprise 576,600 HUF in 2022, with average wage growth above the rate of inflation for both types of employers, which may also suggest that there is a supply market in this field, so employers are constantly looking for skilled and dedicated accounting workforce, typically focused on early-career employees. Professional development in the first few years is best in non-multi-accounting firms, although starting salaries are conspicuously the lowest in these firms. Still, we believe that if one wants to own one's own accounting firm, the best "schools" are in these firms.

Whether one wants to own one's own accountancy practice or work as an accountant for a firm, there will be plenty of opportunities to expand digital skills and knowledge, but there is also a risk if one does not understand the impact on one's organization. The challenges facing the accountancy profession are reflected in the need and rapid adaptation of business practices and processes without "abandoning" basic accounting rules and principles.

Therefore, it was also important to investigate how much accountants fear digitalization and how much they fear their jobs because of increased digitalization. From 2020 to 2022, there is a change from 58% to 70% of those who "do not fear digitalization at all". Overall, therefore, the majority of respondents are optimistic, and this optimism has increased over the period. Between 4% and 6% of respondents are not at all afraid of change. Interestingly, the proportion of respondents who are "a little" afraid of digitalization is relatively high (down from 36% to 26%), but this cautious attitude has decreased, which is positive, as the use of various IT applications by future professionals will be inevitable.

Based on research by Budai and Denich (2021), prospective accountants and accounting students ranked a thorough knowledge of Excel as the most important digital competency, while programming skills were the least important, in addition to their current knowledge of the digital competencies expected by employers. Their results show that each of the digital skills they surveyed will become more valued and important in five years' time. Both data mining and programming skills are expected to be significantly higher in the expectations.

Due to the rapid development of software and various programs supporting accountancy work, and the constant changes in the legal environment, accountancy tasks are constantly changing. At the same time, if we look at the tasks that accountants perform, we can see that at present they still spend most of their time on routine tasks, as shown in Table 4.

As accountants progress in their careers, they tend to take on increasingly complex and higher professional tasks. After 1-2 years, an accountant may be responsible for the full accounting of a company, and after 3-5 years in larger accounting firms, they may coordinate and supervise the work of several accounting colleagues as a team leader, supervisor, or manager.

Table 4. Accountancy tasks by years of experience in the accounting profession

Title	Data recording, preparation	I keep accounts for one area (e.g., customers, suppliers, bank, etc.)	I do all the accounting for a company	Supervise and coordinate the work of my accountant colleagues at lower levels	I do full accounting for several companies.
I am a newcomer	32.97%	32.97%	15.38%	1.10%	17.58%
1-2 years	12.57%	34.29%	12.00%	1.14%	40.00%
3-5 years	4.88%	24.74%	14.98%	8.36%	47.04%
6-8 years	1.99%	25.83%	12.58%	17.88%	41.72%
more than 8 years	3.04%	13.11%	12.65%	22.48%	48.71%

Source: own construcion

With accounting processes becoming more automated and less time-consuming, accountants are increasingly in touch with clients and expanding their advisory services in their day-to-day activities. In their study, Herbert et al. (2016) examined how digitalization and automation are used to eliminate or minimize routine and repetitive tasks, allowing accountants to focus on more creative, non-routine and unstructured tasks that require more thought and additional skills. This change in approach will have an impact on the future activities of experienced accountants. It can therefore be said that accountancy qualifications will continue to be in great demand in the long term and that accountancy qualifications will still be indispensable in the profession in a few years' time. It is therefore important to examine which are the main digital solutions that have or will have an impact on the accounting profession.

4. Conclusion

Digitalization and the development of information technologies represent a major opportunity for companies. Moreover, digitalization brings many changes to the accounting profession, representing both a great opportunity and a significant risk for the accountants of the future. It will change the way accountants work and think. According to the responses to the questionnaire survey, the vast majority of accountants do not fear digitalization. Nor should the accounting profession fear that digitalization will take their jobs away and replace them with robots. Digitalization and automation can be used to perform routine tasks. There are and will be accounting tasks and activities that require critical thinking and creativity, and these cannot all be easily and simply automated. Accountants must be ready for automation, which requires specific and new knowledge and skills from accountants. The information network, knowledge-based systems and data mining are powerful tools for running a successful business. All these new digital solutions will have an impact on reducing manual data entry and improving the speed, quality and accuracy of data. Professional

accountants will become consultants. Therefore, for this potential evolution to occur, accountants must seize the opportunity to develop technology that will facilitate and enhance their profession.

The digitization of processes and the introduction of new software(s) enabling knowledge-based management is very expensive and only available to large companies. The day-to-day digitization of accounting and financial reporting linked to financial markets can have a significant impact on investor decisions. Improvements to IT, analytical and tax knowledge are vital components in the development of the skills required pertaining to modern accounting practices.

These changes require universities to modify their curricula to prepare accounting students to work in a modern environment, alongside automation and digitalization. The education system could include more information on the opportunities and risks of digitalization in the curriculum to provide accounting graduates with better career planning guidelines. In addition, professional bodies can provide future accountants with greater exposure to the opportunities and risks of a digitized environment. In this way, prospective accountants will have a clearer perspective and be better prepared for the real digital workplace. In agreement with other researchers (Frey–Osborne, 2017; Rajeevan, 2020), we also find that the accounting profession will not disappear but will move in the direction of counselling.

References

ACCA (2020): *The digital accountant: Digital skills in a transformed world.* London, ACCA Global.

Alarcon, L. J. – Ng, C. (2018): Blockchain and the future of accounting. *Pennsylvania CPA Journal*, 88(4), 26-29.

Andreea, C. D. – Mihaela, N. A. – Elena, C. N. – Mugurel, T. M. – Nadia, P. A. (2021): An investigation of the perceived impact of IT on the accounting profession. https://cig.ase.ro/wp-content/uploads/2021/09/Codreanu.pdf Date of access: March 3, 2023

Bakulina, G. – Kalinina, G. – Luchkova, I. – Pikushina, M. – Greacheva, A. (2020): Transformation of the accountancy profession during digitalization of agriculture. https://research.amanote.com/publication/6ouv0nMBKQvf0BhivcWk/transformation-of-the-accountancy-profession-during-digitalization-of-agriculture Date of access: March 5, 2023

Barancsuk, J. (2016): A kettős könyvvitel bölcsőjénél. *Köztes-Európa,* 8(1-2), 111-124.

Budai, E. – Denich, E. (2021): Elvárások és várakozások – a számviteli digitalizáció tükröződése. In: Madarasiné Szirmai, A. (ed): *A versenyképesség jövője = Digitalizáció + Szakmai Tudás a pénzügy és számvitel világában. Beyond Financial Reporting Konferencia 2019,* Budapest: BGE. 26-43.

Dai, J. – Vasarhelyi, M. A. (2017): Toward blockchain-based accounting and assurance. *Journal of Information Systems,* 31(3), 5-21.

Duong, D. C. T. – Fledsberg, K. (2019): *Digitalization of the accounting industry: The influence of digitalization on the accountants' role and their self-understanding an exploratory study based on 13 Norwegian accounting firms.* Kristiansand: University of Agder.

Fanning, K. – Centers, D. P. (2016): Blockchain and its coming impact on financial services *Journal of Corporate Accounting & Finance*, 27(5), 53-57.

Fettry, S. – Anindita, T. – Wikansari, R. – Sunaryo, K. (2018): The future of accountancy profession in the digital era. In: Abdullah, A. G. – Widiaty, I. – Abdullah, C. U. (eds.): *Global competitiveness: Business transformation in the digital era*, Proceedings of the First Economics and Business Competitiveness International Conference (EBCICON 2018), Bali, Indonesia, 21-22 September 2018. London: Routledge-Taylor & Francis Group, 8-14.

Fitzgerald, M. – Kruschwitz, N. (2013): Embracing digital technology: A new strategic imperative. *MIT Sloan Management Review*, 55(2), 1-12.

Frey, C. B. – Osborne, M. A. (2017): The future of employment: how susceptible are jobs to computerisation? *Technological Forecasting and Social Change*, 114, 254-280.

Frey, L. – Botan, C. – Kreps, G. (1999): *Investigating communication: An introduction to research methods.* Boston: Allyn & Bacon.

Gartner Glossary (n.d.): Digitalization. https://www.gartner.com/en/information-technology/glossary/digitalization Date of access: February 15, 2023.

Granlund, M. – Mouritsen, J. (2003): Special section on management control and new information technologies. *European Accounting Review*, 12(1), 77-83.

Griffin, P. A. – Wright, A. M. (2015): Commentaries on Big Data's importance for accounting and auditing, *Accounting Horizons*, 29(2), 377-379.

Gulin, D. – Hladik, M. – Valenta, I. (2019): Digitalization and the challenges for the accounting Profession. *ENTRENOVA – ENTerprise REsearch InNOVAtion*, 5(1), 428-437.

Harford, T. (2017): How the world's first accountants counted on cuneiform. https://www.bbc.com/news/business-39870485. Date of access: February 26, 2023.

Herbert, I. – Dhayalan, A. – Scott, A. (2016): The future of professional work: Will you be replaced, or will you be sitting next to a robot? *Management Services Journal*, 60(2), 22-27.

Hirt, M. – Willmott, P. (2014): Strategic principles for competing in the digital age. *McKinsey Quarterly*, 5(1), 1-13.

Hylving, L. – Schultze, U. (2013): Evolving the modular layered architecture in digital innovation: The case of the car's instrument cluster. *ICIS 2013 Proceedings*, 2, 1525-1541.

Karimi, J. – Walter, Z. (2015): The role of dynamic capabilities in responding to digital disruption: A factor-based study of the newspaper industry. *Journal of Management Information Systems*, 32(1), 39-81.

Krajewski, L. J. – Ritzman, L. P. – Malhotra, M. K. (2013): *Operations management: Processes and supply chains*, Hoboken: Prentice Hall.

Mancini, D. – Lamboglia, R. – Castellano, N. G. – Corsi, K. (2017): Trends of digital innovation applied to accounting information and management control systems,

In: Corsi, K. – Castellano, N. G. – Lamboglia, R. – Mancini, D. (eds.): *Reshaping accounting and management control systems: New opportunities from business information systems*, Cham: Springer, 1-19.

Mishina, K. – Takeda, K. (n.d.): *Toyota Motor Manufacturing USA*, HCS, 9-693-019, https://textos.pucp.edu.pe/pdf/449.pdf Date of access: March 3, 2023.

Monga, V. (2015): The new bookkeeper is a robot. *The Wall Street Journal*, https://www.wsj.com/articles/the-new-bookkeeper-is-a-robot-1430776272 Date of access: March 3, 2023.

Moudud-Ul-Huq, S. (2014): The role of artificial intelligence in the development of accounting systems: A review. *The UIP Journal of Accounting & Audit Practices*, 12(2), 7-19.

Partida, B. (2018): Blockchain's great potential, *Supply Chain Management Review*, 22(1), 51-53.

Parviainen, P. – Tihinen, M. – Kääriäinen, J. – Teppola, S. (2017): Tackling the digitalization challenge: how to benefit from digitalization on practice. *International Journal of Information Systems and Project Management*, 5(1), 63-77.

Payne, R. (2014): Discussion of "Digitisation, Big Data and the transformation of accounting information" by Alnoor Bhimani and Leslie Willcocks (2014) *Accounting and Business Research*, 44(4), 491-495.

Pisano, G. P. (2015): You need an innovation strategy. *Harvard Business Review*, 93(6), June 2015, 44-54.

Porter, M. E. – Heppelmann, J. E. (2015): How smart, connected products are transforming companies. *Harvard Business Review*, 93(10), 96-114.

Rajeevan, S. (2020): Accounting: the teaching, the practice and what is missing. *XIMB Journal of Management*, 17(1-2), 15-37.

Rezaee, Z. – Wang, J. (2017): *Big data, big impact on accounting*. October, 42-45. https://aplusmag.goodbarber.com/topics/c/0/i/17867251/big-data-bigimpact-accounting. Date of access: March 11, 2023.

Rom, A. – Rohde, C. (2007): Management accounting and integrated information systems: A literature review. *International Journal of Accounting Information Systems*, 8(1), 40-68.

Sadun, R. – Bloom, N. – Van Reenen, J. (2017): Why do we undervalue competent management? *Harvard Business Review*, 95(5), 121-127.

Sima, V. – Gheorghe, I. G. – Subic, J. – Nancu, D. (2020): Influences of the industry 4.0 revolution on the human capital development and consumer behavior: a systematic review. *Sustainablitiy*, 12, 4035.

Simchi-Levi, D. – Timmermans, K. (2021): A simpler way to modernize your supply chain. *Harvard Business Review*, 99(5), 133-141.

Sinka, J. (2014): Így könyveltek ők. Adózóna. https://adozona.hu/altalanos/Igy_konyveltek_ok_7E7CDU Date of access: February 26, 2023.

Smit, J. – Kreutzer, S. – Moeller, C. – Carlberg, M. (2016): Industry 4.0 – Study for the ITRE Committee, Policy Department A: Economic and Scientific Policy. *European Parliament*, Brussels.

https://www.europarl.europa.eu/RegData/etudes/STUD/2016/57000/IPOL_STU(2016)570007_EN.pdf Date of access: March 18, 2023.

Smith, S. S. (2018): Digitalization and financial reporting: How technology innovation may drive the shift toward continuous accounting. *Accounting and Finance Research*, 7(3), 240-250.

Syed, A. R. – Gillela, K. – Venugopal, C. (2013): The future revolution on Big Data. *International Journal of Advanced Research in Computer and Communication Engineering.* 2(6), 2446-2451.

Sztanó, I. (2019): A barlangrajzoktól a számítógépekig I. Perfekt szakmai blog. https://perfekt.blog.hu/2019/08/14/a_barlangrajzoktol_a_szamitogepekig_i Date of access: March 10, 2023.

Tekbas, I. (2018): The profession of the digital age: Accounting engineering. https://www.ifac.org/knowledge-gateway/preparing-future-ready-professionals/discussion/profession-digital-age-accounting-engineering Date of access: February 18, 2023.

Thorseng, A. A. – Grisot, M. (2017): Digitalization as institutional work: A case of designing a tool for changing diabetes care. *Information Technology & People*, 30(1), 227-243.

Voss, E. – Riede, H. (2018): *Digitalisation and workers participation: What trade unions, company level workers and online platform workers in Europe think.* Brussels: ETUC-European Trade Union Confederation.

Vörös, J. (2009): Az üzleti stratégia ideális hossza. In Bugár, Gyöngyi; Farkas, Ferenc (szerk): *Elkötelezettség és sokoldalúság: Tanulmánykötet Barakonyi Károly tiszteletére,* Pécs, Magyarország, PTE-KTK, 131-142.

Vörös, J. (2010): *Production and service management*, Budapest, Akadémiai Kiadó.

Vörös, J. (2021): Production dynamics in case of organizational learning. *Computers & Industrial Engineering*, 157, 107340, https://doi.org/10.1016/j.cie.2021.107340

Warren Jr. J. D. – Moffitt, K. C. – Byrnes, P. (2015): How Big Data will change accounting, *Accounting Horizons*, 29(2), 397-407.

Yeoh, P. (2017): Regulatory issues in blockchain technology. *Journal of Financial Regulation and Compliance*, 25(2), 196-208.

Yoo, Y. – Lyytinen, K. – Boland, R. – Berente, N. – Gaskin, J. – Schutz, D. – Srinivasan, N. (2010): The next wave of digital innovation: Opportunities and challenges. Report on the Research Workshop: "Digital Challenges in Innovation Research", 1-37. Available at SSRN: http://dx.doi.org/10.2139/ssrn.1622170

Zhang, Y. – Xiong, G. – Xie, Y. – Fan, X. – Gu, H. (2020): The impact of artificial intelligence and blockchain on the accounting profession, *IEEE Access*, 8, 110461–110477.