

Digitalization – a danger to accounting professionals?

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ABSTRACT

Purpose: Nowadays, we talk about an increasing number of tools in the IT area that are being used in the accounting field. We can already discuss automation, robotics, artificial intelligence, and digitalization in accounting practices. This reality is giving rise to more and more discussions about how the era of digitalization of processes influences or will influence the activity carried out by accountants. In this context, our study aims to establish to what extent this new reality in the practice of economic entities is advantageous for professionals in the field or, on the contrary, is a threat from the perspective of taking over tasks, operations or activities that accountants currently still have in their portfolio. **Methodology:** Therefore, using scientific research tools, we will try to clarify whether the accounting profession and professionals are threatened by the developments observed due to the increasing advances that are taking place in digitalization. The research undertaken is based on the analysis of speciality literature, the regulatory framework applicable to accounting in Romania, and the accounting officer based on International Financial Reporting Standards.

Results and Findings: The study aims to identify the advantages and threats that digitalization induces in the field of accounting practice and the major paradigm shifts that digitalization will bring to the exercise of the profession by accountants. The study will also look at the limitations that digitalization has in the field of accounting and the significant changes that digitalization will impose on the education and training of professionals in the field of accounting.

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1. INTRODUCTION

We live in times when the activities carried out by economic entities are marked by certain phenomena, which we notice have gained more and more ground, or there are more and more indications that they are going to exert more and more influence in the not-too-distant future. We refer here to what we generically call the globalization of economies, the circulation of capital, and the digitalization of activities, among other things.

These trends have not bypassed accounting practices and the accounting profession either. Instead, over time, accounting has gone through a series of evolutionary processes that have

made this science indispensable for the business environment. We are talking about a leap that, in time, involved the transition from Luca Pacioli's registers to ERP, cloud accounting, blockchain and other such terms that dominate the business environment today.

Nowadays, there is more and more talk about digitalization. This concept has become dominant in the business environment in the last few years. We are witnessing discussions about the digitalization of activities in various fields, which aim at different levels of implementation of this concept, starting from micro-digitalization to macro-digitalization.

One of the areas in which the implementation of new technologies is very well suited, based on process automation, artificial intelligence, and cloud computing, is the financial-accounting one, due to the repetitive character that many activities, processes or operations performed by accountants.

The idea of conducting this study is based on a reality that cannot be disputed, namely that the digital age is generating very many changes, especially in the labour market, like reduction, hybridization or even the disappearance of some trades which are being taken over by robots. To support this statement, we can consider, for example, the extent to which digitalization has taken place in the case of banking institutions where many of the operations are already transferred to the online environment, without the link between bank and customer being mediated by an employee.

The phenomenon that is the subject of our study must be approached from multiple perspectives by analyzing its many facets so that we can highlight both the positive impact it generates and the possible shortcomings that can be associated with it, as well as the directions of action that should be pursued to maximize the benefits and reduce or eliminate the disadvantages.

Given that, in a particular context, there is talk about both the existence of advantages and disadvantages, we consider that there is a need to analyze the relationship between them to conclude to what extent the phenomenon studied is beneficial or not. By using certain tools specific to scientific research, our study aims to clarify the area in which new technologies and the phenomenon called generic digitalization represent a threat or an opportunity for accounting professionals.

2. RESEARCH OBJECTIVES

Digitalization has revolutionized many areas of activity, fostered the emergence of new business models, and changed the way individuals interact and operate in businesses and

markets (Calvino and Criscuolo, 2019). Therefore, organizations need to recognize and analyze the need for new knowledge and skills that will enable them to fulfil their roles in the workplace to make the most of digitalization. The unique individual requirements create a skills gap for those with extensive business experience but unfamiliar with emerging digital tools and digitized processes (Elg et al., 2021). The impact of digitalization, including employment, has generated increasing interest, mainly due to the anxiety caused by the idea that digital technologies could eliminate many jobs (Freddi, 2018). Some argue that the risk of exclusion from the labour market will only affect those "left behind", i.e., low-skilled workers who do not have specific skills in the high-tech sectors (Salento, 2018).

Given the views expressed in the speciality literature, such as those referred to above, we considered it appropriate to consider what implications digitalization already has or will have on the actual application of the specific accounting treatments, but also to what extent we will witness a significant impairment of the professionals in the field, in the sense of restricting the scope of the services provided by them or even the number of accounting professionals.

This study will allow us to draw a series of conclusions about the effects that the digitalization process generates, directly or indirectly, on accounting practice, the implications for the accounting profession and the measures that can be taken for the adaptation in optimal conditions to the changes of those who work in this field.

To achieve the pre-established objectives of our research, we have proposed several directions of analysis considered relevant in the context of the approached subject, which, in our opinion, may be of interest to various actors working in or interacting with the accounting profession: practitioners in the field of accounting, professional and regulatory bodies, academia, third parties interested in the information products offered by accounting, to name a few. In this sense, the main topics that will be detailed in our study refer to aspects related to:

- 1) advantages and threats that digitalization induces in the field of accounting practice – when a particular phenomenon is growing, it is essential to know the impact it generates both in terms of the advantages generated and the disadvantages it produces;

- 2) the major paradigm shifts that digitalization will bring to the way accountants practice the profession. These need to be looked at as the transformations induced by the phenomenon in our study will lead to multiple changes in the way accountants will pursue their profession in the future. We refer here, on the one hand, to the need to increase the flexibility of the services offered by accountants (digitalization forces them to go far beyond the area of competence that is limited only to translating into a specialized language the operations of

economic entities and reporting third parties) and, on the other hand, the imperative need to adapt, professionally, to new technologies that already exist or will be implemented shortly, which will have a direct impact on the business environment and accounting organization;

3) the limitations of digitalization in accounting – this must be known to determine to what level and to what extent this phenomenon can replace creative thinking and professional reasoning. It is essential to conclude whether this is a total or partial digitalization of accounting, the social impact of this phenomenon, and the effects noticed by the changes that appeared, including on the labour market. At the same time, it should be mentioned that this objective will be approached not only from the perspective of accounting principles and treatments applied in the practical activity but also from the perspective of the limits that the existing regulatory framework may impose, knowing that it is not designed to facilitate the digitalization process;

4) the significant changes that digitalization will impose in the process of education and training of professionals in the field of accounting – this represents a topic worth studying because the adaptability to new technologies must be a characteristic feature for future accountants as we witness a hybridization of the accounting profession or even the reinvention of new accountants, who need to acquire new skills.

3. RESEARCH METHOD

To achieve the proposed research objectives, it is necessary to use appropriate tools that allow us, on the one hand, to obtain relevant results and, on the other hand, based on the obtained results, to formulate pertinent conclusions that will allow professionals in the field and other researchers to capitalize on them from a practical point of view or from the perspective of new research initiatives that will be initiated later.

Therefore, we will use the following main research tools based primarily on abductive reasoning, which, in our opinion, will allow us to obtain optimal results regarding the proposed objectives and to formulate practical conclusions for those who will later access the information provided through this paper:

- in the first phase of the research, we will use the analysis of the speciality literature to clarify the main conceptual elements used in the study, but also to identify convergent and relevant views expressed by other researchers who agree with the authors' ideas and they can support or reinforce their personal opinions.

We believe that to understand better the debates initiated in the fourth part of our study, it is essential to clarify the terms we frequently use from a conceptual point of view.

On the other hand, we believe that the authors' personal opinions will be of greater scientific importance if they are supported by the views of other researchers who have approached similar topics or at least close to those of our study.

- the second phase of the research will have two main components, as follows:

a) the first component involves capitalizing on the information obtained from studying the speciality literature and will allow us to outline in a reasoned and relevant manner our own opinions on the topics discussed in our study;

b) the second component consists of the comparative analysis of the accounting regulations in force in Romania and the general conceptual framework of the International Financial Reporting Standards. This will allow us to identify and present, by way of example, some principles, rules and accounting treatments that accounting professionals apply in practice, which we consider relevant and illustrative to support the idea that, at least for the time being, digitalization does not allow a complete replacement of creative thinking and professional reasoning in accounting and financial reporting.

We consider this approach original and specific to our research because, in the speciality literature, we find studies and points of view that are usually based on general analysis, case studies or surveys and less or not at all on technical discussions related to the techniques. And the accounting procedures themselves.

- the third phase of our research will focus on the formulation of relevant conclusions based on the main findings and views expressed throughout the study, which will help us determine how digitalization will influence the role of accountants and whether digitalization is a threat to the accounting profession.

At the same time, being aware that any research approach is perfectible, we will point out the main limitations of our study and the extent to which they influence the accuracy of the results obtained.

4. RESULTS AND DISCUSSIONS

4.1. The leap from pencil to artificial intelligence or a short history of the evolution of technologies used in accounting

In retrospect, it can be seen that in the field of accounting, there has been a continuous evolutionary process characterized by the consistent adoption of new technologies that have

emerged over time. This process highlights both the extraordinary leap that science has made over the years and how the implementation of these technologies has contributed to the development and modernization of accounting and the accounting profession.

Technological advances over time in the transition from perforated cards to electronic tubes and transistors and then to integrated circuits have irreversibly marked the evolution of the equipment used in accounting to facilitate and streamline the work of accounting professionals. These advances radically changed the perception of accounting as a science, shattering the image of the man with the armrests, the pencil sitting behind his ear, surrounded by a mountain of papers.

In our opinion, the evolutionary process that accounting has gone through so far, from the perspective of the implementation of information technologies, highlights three main stages, which, in chronological order, refer to:

- 1) classic accounting (manual);
- 2) computerized accounting;
- 3) accounting digitalization.

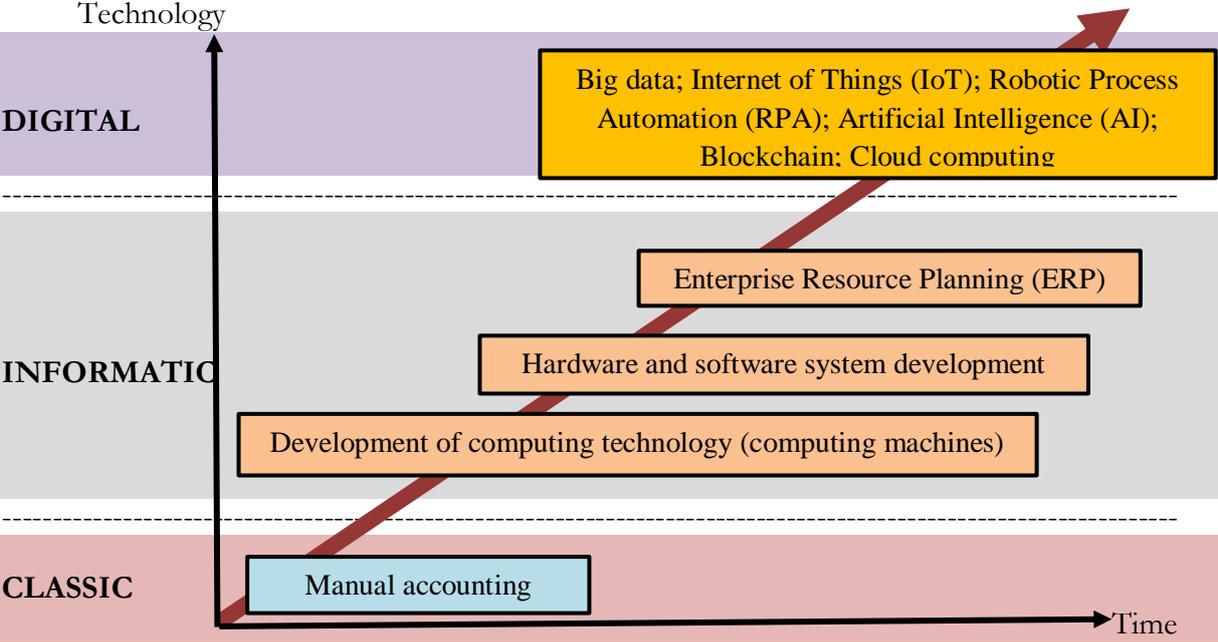


Figure 1: The evolutionary process of implementing technologies in accounting
 Source: Authors' processing

From the figure presented above, it can be concluded that the digitalization phenomenon has its origins in the computerization stage of accounting. The early stages of this phenomenon are being put together to implement ERP (Enterprise Resource Planning) systems. The evolution of ERP systems came immediately after developing hardware and software systems

(Tavana et al., 2020). These resource planning systems have been in place since the 1990s to have uniform information systems and redesign business processes (Palaniswamy, 2002).

At the same time, Ehie and Madsen (2005) argue that an ERP system is an integrated software solution covering a range of business processes and allowing companies to gain a holistic view of the enterprise. The ERP systems enable companies to integrate their business functions into a unified and integrated business process. Al-Mashari (2002) believes that the continuous development of ERP systems has been considered one of the major IT innovations, an idea that can be supported by the point of view of Muscatello et al. (2003), according to whom enterprise resource planning systems can provide impressive strategic, operational and informational benefits to the companies that adopt them if they are successfully implemented. The growing focus on ERP systems is explained by the fact that they have proven to provide significant improvements in efficiency, productivity, quality, cost reduction, and more efficient decision-making, as seen from the analysis by Ngai et al. (2008).

In the US, ERP systems are ubiquitous in the manufacturing sector (Mabert et al., 2003), which explains the importance that economic entities attach to streamlining processes through automation.

We can say that this approach, which aims to optimize activities in various fields of action by using digital technologies, was the starting point for a more extensive process aimed at what we call digitalization or digital transformation.

Although this phenomenon is increasingly analyzed in the speciality literature, some contradictions exist in the terminology used. Sometimes, a clear distinction is not made between two concepts that, in our opinion, are different. We refer here to digitalization versus digitization.

Without trying to continue the debates initiated in the speciality literature on this topic, we will express our support for the views of some specialists who distinguish between the two concepts discussed.

Thus, Brennen and Kreiss (2016) argue that digitalization is how many areas of social life are restructured around digital communication and media infrastructures, while digitization refers to the material process of converting analogue information streams into digital bits. We find similar points of view in Legner et al.'s (2017) research. Moreover, Rachinger et al. (2019) believe that digitization is the framework for digitalization, which he defines as a phenomenon of exploiting digital opportunities.

From the above, we can conclude that digitalization is a phenomenon with greater complexity than digitization because it is based on the latter and involves the integration of several technologies in all aspects of everyday life (Gray and Rumpe, 2015).

The complexity of the phenomenon we are talking about, which we generically call digitalization, is determined not only by the magnitude and influence it has on many economic and social life areas but also by the complexity of the technologies used to achieve the proposed technology objectives. For example, suppose we refer to artificial intelligence (AI) as the spearhead of the digitalization process. In that case, we find that new concepts are already being used (IESBA, 2020), which the vast majority of accounting professionals have not even understood yet:

- assisted intelligence called robotic process automation (RPA) – machines mimic the tasks already performed by people who continue to make decisions;
- augmented intelligence – involves collaboration between people and machines in the decision-making process, allowing people to do more than they can now;
- autonomous intelligence – machines perform tasks and make decisions independently, without human intervention.

We do not claim that we have made an exhaustive presentation of the evolutionary process that the technologies used in accounting have recorded over time through the few ideas supported. Still, we intended to emphasize that the development of accounting was determined by the development of human society and human activities. Technological progress has profoundly marked this science and those who work as practitioners in this field in its various historical stages.

4.2. The impact of digitalization on the accounting profession: advantages, disadvantages, paradigm shifts

The evolution of accounting, in general, has been determined by the development of human society and the economic activities carried out by people, which, over time, have become increasingly complex. Accounting had to keep up with the economic-social and technological progress, being subjected to a continuous process of adapting the instruments used to achieve its object of study. From a time when technological progress made this possible, the process we refer to also included the use of the latest technologies that have emerged over time, which have transformed accounting and professional accounting and the public's perception of them.

The introduction of IT technologies in the field of accounting has always influenced the processes of collecting, storing, processing and capitalizing on information at the level of economic entities, and this, in our opinion, can be analyzed from a double perspective:

a) from the perspective of the implications on the accounting information system, the technological progress and the implementation of the technical solutions existing at that time had the effect of streamlining processes and better use of available information as economic activities became more complex and information needed for the rigorous substantiation of the decisions registered a continuous increase.

b) from the perspective of the influence exerted on accounting professionals, we consider that the impact produced by the adoption of the technical solutions available at that time generated two categories of effects:

1) streamlining/facilitating the work of accountants and increasing the quality of the information provided;

2) affecting the human factor to restrict the field's need for labour.

These two main categories can be discussed as a result of the implementation of various technical solutions in the work of accountants, regardless of the time at which these solutions were adopted. Of course, the discussion can be nuanced. Various impact studies can be done about the magnitude of each of the two categories of effects, depending on the technical solution adopted at a given time. We generally consider these effects that have been felt and are still felt by accounting professionals due to the transition from classical to computerized accounting and now to digital accounting.

We believe that this idea could be extended and generalized to other areas of activity because technological progress has generally aimed at streamlining activities (getting more, with less effort, in a shorter time) and facilitating people's work. At the same time, in the spirit of the desire to streamline activities and reduce costs, it also had a flip side of the coin represented by the reduction of the need for labour.

Let us look back at the evolution of the accounting profession under the impact of the implementation of information technology. First, we find that accountants have always lived under the threat of technological progress's effects on them; the difference between the various stages of this process has consisted, of course, in the magnitude of the impact generated. In this context, we can say that there is a directly proportional link between the complexity of the technical solutions implemented at various times and their results, including from the perspective of the influence on the human factor.

We can notice the same thing now, but also in the more or less distant future, in the context of the generalization of the digitalization phenomenon. Just as in the past, the human factor, respectively the professional accountant, was not excluded from the equation. We consider that the same will happen in the future only, this time, **the magnitude and nature of the effects will be different** because, on the one hand, as we will detail later, the professional reasoning will not be able to be entirely replaced by algorithms, and on the other hand, the technical solutions currently used, or which are expected to be implemented shortly, are much more elaborate and will have a much more consistent impact.

We believe that the adoption of modern information technology or, more recently, modern digital solutions **should be seen as an opportunity and a factor to stimulate/develop the accounting profession and not necessarily as a threat**. This is because accountants have proven over time that they are very versatile and can adapt to the technological changes that have taken place within their profession. That is why we believe that **the digital transformation we are currently witnessing must be a factor of progress for the accounting profession and not one of regression** for at least two reasons, which also translates into two desiderata:

- the accounting profession must not be confined to the present (there can be no question of the past), hence the need to adapt to new digital technologies that are already used or will be implemented in the future, which involves the development and acquisition of new digital skills by accountants;
- a paradigm shift in the place and role of the professional accountant in supporting the economic and business environment.

The fact that the changes that will take place within the accounting profession as a result of the digital revolution must be perceived as a challenge and an accumulation of opportunities is also evident from the message sent by Charles Tilley, Chairman of the IFAC (International Federation of Accountants) Professional Accounting Committee, who said that “The opportunities for accounting professionals are huge, but only if they accept change as inevitable and work proactively to shape their future roles in the industry.” (IFAC, 2019)

The implications of this statement are two-fold. On the one hand, accounting professionals have to keep up with technological progress by updating and acquiring new skills in digital solutions, regarding the second desideratum. However, on the other hand, we are talking about a rethinking of the status that accountants will have within economic entities.

As we said before, accountants are essential, but their role will likely be different from the one we know today. Given that digital solutions are expected to take over a large part of the

operations they have performed or are still performing with the help of classical information technology, there is the issue of reconsidering how the accounting profession and its representatives will continue to serve the public interest.

At the same time, we must not neglect the fact that the pace that will dictate this paradigm shift in accounting, as a result of the process of digitalization and automation, can be accelerated not only by the speed with which new digital technologies will be implemented but also by certain unforeseen factors that may occur at some point in time. An excellent example of this, unfortunately still relevant today, is the health crisis caused by the COVID-19 pandemic, which has stimulated the digitalization process and increased its importance through restrictions imposed by the authority's accounting field.

This paradigm shift in accounting and accounting services is also noticed by other authors, who note that significant changes are foreshadowed by the activities that will define the accountants of the future.

For example, Gulin et al. (2019) believe that the automation of accounting processes will reduce the time allotted for them to occur, and accountants will become more and more connected to customer requirements by paying more attention to consulting services. Other authors (Olaru, 2021) believe that digitalization is an opportunity for accountants to transform their profession, considering that this phenomenon changes the way we work and changes the role of the accountant himself. In this context, we also consider that the ability to analyze data and statistical skills will be increasingly in demand (Krájník and Demeter, 2021). In addition, accountants will have to deal with complex issues that need to be interpreted regarding accounting requirements, supported by expert legal systems based on artificial intelligence with self-learning and speech recognition interfaces (Leitner-Hanetseder et al., 2021).

Regarding the paradigm shift generated by the phenomenon of digital transformation, we believe that it will materialize in a series of changes regarding the place and role of accounting professionals, which will aim at either wider involvement in activities that are not currently predominant or orientation to new activities and tasks that will involve a more efficient use of the information flows obtained. In our view, such actions, which should form the basis of the portfolio of future accountants' concerns, address certain aspects, some of which we consider to be representative but not limiting:

- support for organizations in the transition to the digital economy;
- guaranteeing the integrity, correctness and reliability of the financial data processed within the digital solutions agreed by each organization;

- using technological advantages to facilitate the provision of opinions to support integrated thinking and reporting;
- analysis and interpretation of complex data necessary to obtain information that will be used later to generate reports to support the management process to improve financial results;
- validation of the results generated by the adopted digital solutions and supporting the processes of analysis and more efficient risk management in support of the decision-making act;
- taking on the role of strategic advisor and assessing changes in the business model and their economic effects through scenarios and forecasts;
- broader involvement in the data modelling process, including complex solutions based on artificial intelligence;
- assuming the role of teammates in multidisciplinary teams to identify strategic problems, which could be solved efficiently by using complex data-based models;
- framing, analyzing and explaining complex economic aspects in a given context, based on understanding the strengths and limitations of the data, assumptions and models underlying the information, amongst others.

Therefore, we can say that the two desiderata mentioned above become the sine qua non-conditions for accountants, given that digital technologies affect their profession, both in terms of the types of professional activities carried out and the tools and approaches used by them when carrying out their professional activities. They will be prepared for the challenges of the digital future if they have improved skills and abilities in areas other than those strictly related to their specialization, such as statistics, data and data applications, and business model management, to name a few. (IESBA, 2020; IFAC, 2019).

4.3. About professional judgment versus artificial intelligence in the accounting field

It is well known that in accounting, the use of what we call generic professional reasoning is widespread. Given that accounting operates with essential accounting treatments and alternative accounting treatments, and various methods or procedures, it turns out that, inevitably, in many cases, the professional accountant must value his professional reasoning. The performance of various processing specific to the accounting method and the manifestation of accounting options, based on a regulatory framework to which accountants constantly refer, define characteristic features of their activity.

Working in accounting does not only involve the application of automation through which certain operations are resolved that are repetitive and which are undoubtedly inherent. In practical work, accountants are often put in a position to apply, estimate, choose, interpret, or reason in a given context so that the solution provided is the optimal one. In this context, it is worth mentioning that accounting professionals must operate with estimates to establish specific values (fair value, residual value, recoverable amount). They must opt for various methods or models of accounting treatment (expression of options for assessment methods for derecognition of inventories, face of options for depreciation methods, presentation of options for the application of essential or alternative accounting treatment in respect of property, plant and equipment, among others). Of course, the list of examples remains open.

How much of the professional reasoning that accountants currently exercise can be taken over/assumed by algorithms? Unfortunately, we will only have a definite answer to this question in the future, a future that does not seem to be very distant but which nevertheless depends on a set of factors whose detailed analysis requires, in our opinion, a separate study.

However, to argue the point of view expressed above, we will refer to the specifics of the regulatory framework applied in accounting by way of example. In our opinion, the applicable accounting standards, both national and IFRS-based, are not intended to facilitate the process of digital transformation but rather to serve the purpose of providing information that meets the desire to give an accurate and fair view of one's financial position and results.

We consider that in the context of the current regulatory framework in accounting, which professionals in the field must inevitably apply, the value and importance of professional judgment remain indisputable simply because this regulatory framework we are referring to was not designed from the perspective of stimulation/supporting the digital revolution. Of course, given this remark, we can ask other questions to which the future and the professionals of the future will be able to formulate a credible answer: "Is it possible to witness a reconfiguration of the accounting regulatory framework from the perspective of supporting digitalization? Will the next technological revolution impose such a radical change in substantiating accounting rules? Will the digital revolution dictates a rewrite of accounting for a better adaptation to the new requirements dictated by the future processes of collecting, storing, processing and capitalizing on data/information?"

Referring to an unavoidable reality, such as the present in which we live, which reveals certain characteristic features of the current regulatory framework in accounting, we express the opinion that creative thinking and professional reasoning applied by accountants will

continue to play an important role, especially if we consider the effects of the paradigm shift we talked about in paragraph 4.1.

Even though a significant part of the work of accounting professionals, as we know it today, will be taken over by digital solutions and translated into various algorithms, we still need to credit human specialists with an essential role in the work to be done in accounting. In support of this view, we will discuss a concrete example that we consider relevant in this context, which will be presented in the form of a comparative analysis between IAS 36 "Impairment of Assets" (IFRS Foundation, 2021) and the accounting regulations applicable in Romania, respectively Minister of Finance Order no. 1802/2014. In this comparative analysis, we will not try to point out, in particular, the technical aspects regarding the accounting solution for the impairment of assets. Still, we will highlight those elements that, in our opinion, cannot be attributed to artificial intelligence but which require the use of professional reasoning and critical thinking on the part of the professional accountant.

Table 1: Comparative analysis of asset impairment issues
(example of the importance of critical thinking in accounting)

IAS 36	MFO no. 1802/2014
To determine the impairment of assets, it is necessary to analyze some internal and external sources of information, which can indicate the possibility of a value impairment.	
Impairment of assets is estimated as the difference between the carrying amount (net), based on historical cost and the recoverable amount.	Impairment of assets is estimated to be the difference between the carrying amount (net) based on historical cost and the present value of inventory.
The recoverable amount is determined by choosing the highest value between the fair value of an asset, fewer costs to selling and its importance in use.	The current value is the expression of professional reasoning as it is estimated about the market price, the usefulness of the assessed element, the degree of wear, the state in which it is, and so on.
The fair value of fewer costs to selling is estimated based on: firm sales commitments; publicly available information (catalogues, price lists); the latest transactions with similar assets. The value in use requires estimating future cash flows and updating them by applying an appropriate discount rate.	The determination of the market price is based on elements similar to those considered to estimate fair value and fewer costs to sell. Assessing the usefulness of assets involves, among other things, estimating future cash flows that the investment in question is expected to generate.
Reasonable assumptions should be considered when forecasting future cash flows, avoiding excessive growth rates, anticipating significant cost reductions or unjustified lifetimes, and considering previous experience.	
The discount rates should reflect current market assessments of the time value of money and the specific risks of the assets for which estimates of future cash flows have not been adjusted.	

The accounting settlement for impairment requires the recognition of expenses or income based on the size ratio between the recoverable amount and the carrying amount and the subsequent evolution of the recoverable amount.	The accounting settlement for impairment requires the recognition of expenses or income based on the size ratio between the present value (inventory) and the carrying amount and the subsequent evolution of the current value.
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Source: Authors' processing

From the information summarized in Table 1, it is easy to see that, in the case of both accounting standards, the accounting treatment applied to determine and record asset impairment relies heavily on analysis, estimates, interpretations, forecasts, and the expression of options. All these operations are indisputably human intelligence attributes and not artificial ones. In an ideal scenario, we can say that the results of possible processing performed using algorithms should be doubled by a subsequent verification performed by human operators, confirming the rigour and correctness of processing; however, in this case, the idea of the efficiency of the approach taken and even the very usefulness of the digitalization process would have been called into question.

Of course, this is just one of the examples through which we have tried to emphasize the idea that, in the field of accounting, the manifestation of critical thinking, performing relevant analyses and interpretations continues to play a significant role, and this role, at least for now, cannot be fully assumed by artificial intelligence.

That is why we believe that the professional accountant of the future will continue to play an essential role in the meaning of this gear involved in the production, communication and use of financial-accounting information, even in a paradigm shift in the position and the importance of accountants.

4.4. The importance of the educational process in supporting and facilitating the transition to the digital age

As we pointed out earlier, the digital revolution and process automation will change both the way we work in accounting and the role of accounting professionals. To continue to evolve, the accounting profession will need to adapt and position itself to take advantage of all digitalization opportunities.

In our opinion, this adaptation aims at following several directions of action, of which we consider two to be very important, and they refer to:

1. identifying areas of work that computers cannot automate and deepening the contributions that accountants can make in these areas;

2. adapting the processes of education and continuous professional development so that both young graduates and experienced professionals acquire those skills that will allow them to adapt quickly to the new requirements imposed by technological progress.

Regarding the second course of action, we identify two main actors who can substantially contribute to achieving the objective of preparing accountants for the challenges of the future. On the one hand, we refer to higher education institutions in economics and, on the other hand, to the professional bodies that coordinate the activity of the professionals in the field of accounting.

The digitalization process may come with several possible shortcomings for accounting professionals, of which the prospect of job losses in the field is the biggest threat. Therefore, professional development in the field of accounting must be adapted and constantly correlated with the continually changing requirements of the labour market and with the expectations of employers, who want employees as versatile as possible and with an increased capacity to adapt.

To determine the extent to which higher education institutions are concerned with updating their curricula so that they respond as well as possible to the demands coming from the labour market, we conducted a study based on public data provided by Romanian profile faculties, on the curricula of the study programmes in the field of accounting, both for the bachelor's degree and for the master's degree. The selection criterion of the faculties was their affiliation to the universities in the first six positions in Romania, according to the number of students, according to the latest report prepared by the National Council for Financing Higher Education in Romania (2020). After selecting the faculties based on the criterion above, the curricula of the study programmes in accounting for the academic year, 2020-2021 were analyzed. The aim was to identify study subjects to develop skills in using digital technologies. The results of the study are presented in Table 2.

Table 2: Existence or absence in the curricula of the study programmes in the field of accounting of the subjects that confer competencies in the use of digital technologies

No.	University/ Faculty	Study programme	Proposed subject
1.	"Babeş – Bolyai" University of Cluj / Faculty of Economics and Business Administration	Accounting and Management information systems (bachelor)	<ul style="list-style-type: none"> - Economic informatics - Databases and programs - Design of management information systems - Introduction to computer programming - Algorithms and data structures - Integrated ERP information systems - Managerial and management information systems
		Accounting expertise and audit (master)	<ul style="list-style-type: none"> - Business & technology - Computer-aided audit techniques

			- Multidimensional data analysis
		Accounting management, audit and control (master)	- Business & technology - Information technologies useful for the accounting professional - Computer-aided audit techniques - Multidimensional data analysis - Business assistance systems
		Accounting and organizations (master)	- Exploitation of the organization's data through Data and Process Mining
2.	"A. I. Cuza" University of Iași / Faculty of Economics and Business Administration	Accounting and management information systems (bachelor)	- Business information technologies - Business software tools - Database - Protection and security of information systems - Financial accounting information systems - Integrated ERP systems
		Accounting, expertise and audit (master)	- Digital accounting
		Accounting, diagnostic, assessment (master)	-
3.	Bucharest University of Economic Studies / Faculty of Accounting and Management Information Systems	Accounting and management information systems (bachelor)	- Office applications technology - Financial-accounting databases - Programming languages - Management of relational databases - Web applications development - Financial-accounting IT products - Technologies for the development of IT management applications - Management information systems - Business intelligence
		Accounting, audit and management information systems (master)	- ERP systems - Computer systems design - Audit and control of information systems
		Accounting, control and expertise (master)	- ERP systems
		Business accounting (master)	-
		Accounting and taxation of economic entities (master)	- ERP systems
		Management information systems (master)	- Accounting for online business - Design of management information systems - Software robots and business process automation - ERP systems implementation - Web management information systems - Information systems security - Big data - Simulation of business processes - Artificial intelligence - Cloud computing - Mobile applications development
4.	"Transilvania" University of Brașov / Faculty of Economic Sciences and Business Administration	Accounting and management information systems (bachelor)	- The basics of economic informatics - Database - Computer programming - Accounting software packages - Analysis and design of computer systems - Computer systems for decision support
		Accounting policies, audit and management control (master)	- Integrated computer systems
5.	University of Craiova /	Accounting and management information systems	- The basics of information technology - Economic informatics

	Faculty of Economics and Business Administration	(bachelor)	<ul style="list-style-type: none"> - Economic information systems - Database - Decision support systems - ERP accounting simulations - ERP management accounting projects - Accounting applied through ERP
		Accounting and financial reporting by international standards (master)	<ul style="list-style-type: none"> - Management of enterprise information and decision systems
		Audit and business consulting (master)	<ul style="list-style-type: none"> - Processing and capitalizing on financial information - Information technologies for audit
		Accounting management, expertise and audit (master)	-
6.	West University of Timișoara / Faculty of Economics and Business Administration	Accounting and management information systems (bachelor)	<ul style="list-style-type: none"> - Economic informatics - Analysis and modelling of information systems - C # programming - Database - Computer systems design - Computer systems for accounting - Decision support systems - ERP-SAP
		Financial-accounting audit (master)	<ul style="list-style-type: none"> - Computer systems audit
		Accounting and auditing in public institutions (master)	<ul style="list-style-type: none"> - Data analytics
		Accounting control and governance (master)	<ul style="list-style-type: none"> - Data analytics - Integrated computer systems (ERP)
		Accounting expertise and business evaluation (master)	<ul style="list-style-type: none"> - Data analytics

Source: https://econ.ubbcluj.ro/n1.php?id_m=3&m=Oferta%20educationala; <https://www.feaa.uaic.ro/>; <https://planinvatamant.ase.ro/SelectiePlan1.aspx?pp=20>; <https://drive.unitbv.ro/s/mpaWb2gZQ4GwSbx>; <http://feaa.ucv.ro/one/index.php?lang=ro>; <https://feaa.uvt.ro/ro/>

From the analysis of the data presented in Table 2, it can be concluded that, in general, undergraduate programmes for Accounting and Management information systems provide the basic knowledge necessary for a practitioner. However, these are more oriented towards classical training in economic informatics, aiming at using software applications dedicated to the financial-accounting field and, at most, familiarity with specific ERP systems.

In the case of the master's programmes analyzed, the level of competencies provided is higher than the bachelor's degree cycle. Still, there may be a deficit of subjects that confer digital competencies. For example, some study programmes do not have any issues in their portfolio. Other programmes have an insufficient number of topics in the curriculum. Only one of the master programs analyzed offers skills in cloud computing, big data, artificial intelligence, and RPA.

Although the university environment is becoming more and more aware of the importance of ensuring digital skills are as developed as possible, it seems that the opinion found in the speciality literature is genuine that the study programs in the field of accounting do not

provide adequate technical knowledge, at the level of labour market requirements (Doost, 1999).

From the analysis, it can be concluded that the academic institutions involved in the training of accounting professionals are firmly anchored in the present situation. Still, to a greater extent, it should have anticipatory reactions to the changes expected to occur in the labour market, including ensuring adequate digital skills. Given that there is a degree of inertia in education systems in terms of operational adaptation to the requirements of the labour market, we believe that the updating of curricula must be done in an anticipatory manner so that the production of specialists can keep up with the rapid changes that technological progress is generating.

At the same time, in the spirit of the idea of constantly updating professional knowledge and accumulating new skills, it should be emphasized that the academic environment also has the task of supporting the process of continuous professional development by organizing training courses for active professionals who have acquired some experience at their jobs. Therefore, higher education institutions need to be engaged in training those who intend to enter a particular profession and, in the case of active professionals, supporting their efforts to develop previously acquired skills.

Professional bodies must also play an active role in this area of professional development. They must support their members to be prepared for future challenges. This process of continuous professional development must ensure that the skills required by the business environment be flexible and relevant while providing long-term learning opportunities (Şova and Popa, 2020).

In this regard, we believe that professional bodies should adopt the following courses of action through which to contribute in a relevant way to the professional development of members:

- to understand and accept the importance of preparing accounting professionals for the challenges of the future;
- to make professional development a priority, which should also become a relevant indicator for the activities undertaken in support of members;
- to organize a continuous professional development programme for members by constantly reporting to the ever-changing requirements of the business environment;
- to establish a coherent implementation strategy of the professional development programme.

Moreover, for the implementation of the above steps, we consider necessary the collaboration between educational institutions and professional bodies because digitalization changes the

business world more than anyone could have imagined it, directly and indirectly, produces effects in accounting education, in the perception of the profession and the need for continuous professional development to keep pace with current and future needs (Şova and Popa, 2020).

5. CONCLUSIONS

Contemporary reality reveals certain aspects that strongly suggest that the accounting profession and the professionals working in this field are going through a period marked by significant changes.

The era of digitalization influences all areas of activity, and the one in which accountants work is not bypassed by the roller of technological progress. As it can be directly seen, this phenomenon produces necessary transformations, to which accountants, as they have always done, must adapt operatively to retain their role as representatives and supporters of the public interest in a highly volatile and complex economic environment.

During our study, we underlined the idea that in the current context, but also of the significant changes that foreshadow in the not-too-distant future, the role played by accountants within the economic entities in which they operate will undergo certain transformations under the direct action of the phenomenon called generically, digitalization.

For this professional category to remain relevant, the paradigm shift in the role played must be approached as an opportunity for assertion and development in taking on new responsibilities to complement those that are current or lost as a result of the digitalization process. We reiterate the idea that the digital transformation we are currently witnessing must be a factor of progress for the accounting profession and not a regressive one.

For the significant changes we are referring to, to generate progress for the accounting profession and not threats to it, its representatives must act in such a way as to adapt to the new requirements of the business environment.

However, the responsibility for adapting to new market conditions should not be left solely on the shoulders of accountants. Instead, all other actors must actively and consistently support them with training and professional development responsibilities. Here we refer, on the one hand, to academia, through higher education institutions and, on the other hand, to the professional bodies that manage the accounting profession. These actors need to play an essential role in updating the skills of accounting professionals in response to new demands from the business environment.

It is not yet time to imagine a world without accountants because the information that accounting officers make available to the general public must continue to be based on professional reasoning and critical and analytical thinking to remain relevant regarding the satisfaction of the public interest. Process automation should not result in the total replacement of the human factor but only in relieving it of specific repetitive tasks to give it more time for more relevant, high-quality analyses that serve to a greater extent, the idea of supporting the decision-making process.

We are convinced that digitization will not make accountants a kind of dinosaurs of the business environment, but rather the development of digital technologies will accelerate the process of transforming the accounting profession.

Without being exhaustive, we consider that the undertaken research has achieved its objectives; the main results obtained in our study are focused on certain punctual aspects to which we refer synthetically in the following:

- simultaneous highlighting of both the benefits and the threats that the digitization process generates for both accounting practice and accounting practitioners, which allows more precise quantification of the effects caused by this process;
- a better awareness among professional accountants of the fact that, in the conditions of technological progress whose pace is accelerated, it is necessary to rethink the way of exercising the profession in the field of accounting so that they are perfectly adapted to the new requests coming from the business environment and successfully face the challenges that the era of digitalization brings before them;
- arguing the thesis that the value and importance of professional reasoning remains indisputable in terms of accounting since the manifestation of critical, creative thinking, as well as the performance of relevant analyses and interpretations, continue to play a significant role in the process of financial communication, and this role, at least for now, cannot be fully assumed by artificial intelligence;
- the characterization of the extensive evolutionary process that digitalization induces within the accounting profession and the identification of the actors and the roles they must assume in this process.

For digitalization to determine the evolution of the accounting profession and not its restriction or disappearance, we recommend to the profession **the active and anticipatory awareness of the informational needs of the companies** operating in the economic environment so that these needs can be met in a more relevant manner than at present.

Taking into account the limits of our scientific approach and the results obtained, we consider that it is necessary to continue and extend the scientific investigations about certain aspects that concern the opportunity and the real possibilities of modelling the national/international accounting regulatory framework to ensure increased compatibility between the objectives of the financial communication process and those of the digitization process. At the same time, we also consider it essential to know how the main actors – professional accountants – perceive this stage that their profession goes through, requiring a study of the impact of digitalization strictly from the perspective of those who work directly in this field.

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