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AUTOMATION OF ACCOUNTING PROCESSES: THE IMPACT OF ARTIFICIAL INTELLIGENCE AND ERP SYSTEMS ON ACCOUNTING

AUTOMATIZACIJA RAČUNOVODSTVENIH PROCESA: UTJECAJ UMJETNE INTELIGENCIJE I SUSTAVA ERP NA RAČUNOVODSTVO

ABSTRACT: The introduction of ERP (Enterprise Resource Planning) systems and AI (Artificial intelligence) technology has revolutionized the accounting space igniting automation that has been crucial for cost reduction and efficient resource use. A lot of companies have engaged in implementing ERP systems and/or AI tech in order to keep up with the changes and the very competitive business environment. Given the lack of research on this topic, a survey has been sent to Macedonian firms to assess the level of accounting digitalization, as well as the related benefits and drawbacks. The majority of the firms have implemented either ERP or AI tech, with AI lagging as it is considered a novel technology. However, both ERP and AI tech are still in an early stage called the implementation zone. The greatest benefits in the accounting sector come from quality reporting, up-to-date decision-making, better resource use given the increased efficiency, and reduced processing time. On the other hand, the disadvantages are that these systems are costly, and specific know-how is required for proper implementation and benefit maximization. This study is of value for the business sector and policy makers as it sheds light on the developments necessary to remain competitive, and it guides policy makers in determining the pre-requisites to supporting and scaling local businesses.

KEYWORDS: Accounting, ERP, AI, benefits, disadvantages

JEL CLASSIFICATION: M4, M1

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SAŽETAK: Uvođenje sustava ERP (Enterprise Resource Planning) i tehnologije (AI) umjetne inteligencije revolucioniralo je automatizaciju računovodstvenog prostora, koja je bila ključna za smanjenje troškova i učinkovito korištenje resursa. Mnoge su se tvrtke uključile u implementaciju sustava ERP i/ili tehnologije AI kako bi išle u korak s promjenama i vrlo konkurentnim poslovnim okruženjem. S obzirom na nedostatak istraživanja o ovoj temi, makedonskim tvrtkama poslano je istraživanje kako bi se procijenila razina računovodstvene digitalizacije, kao i povezane koristi i nedostaci. Većina tvrtki implementirala je ERP ili tehnologiju AI, pri čemu umjetna inteligencija zaostaje jer se smatra novom tehnologijom. Međutim, i ERP i AI još uvijek su u ranoj fazi koja se naziva zona implementacije. Najveće koristi u računovodstvenom sektoru imaju kvalitetno izvješćivanje, ažurirano donošenje odluka, bolja upotreba resursa s obzirom na povećanu učinkovitost i skraćeno vrijeme obrade. S druge strane, nedostaci su u tome što su ti sustavi skupi, a specifično znanje potrebno je za pravilnu provedbu i maksimiziranje koristi. Ova studija vrijedna je za poslovni sektor i kreatore politika jer rasvjetljava razvoj događaja potreban za ostanak konkurentnim i usmjerava kreatore politika u određivanju preduvjeta za podršku i širenje lokalnih poduzeća.

KLJUČNE RIJEČI: Računovodstvo, ERP, AI, koristi, nedostaci

JEL KLASIFIKACIJA: M4, M1

1. INTRODUCTION

Digitization has had a major effect on the accountants' practice during the later years where the development of technology in accounting has grown extensively (Güney, 2014). This is probably because of involvement of computers in the business back in 1980's. This phenomenon definitely changed the way accounting is executed. The introduction of computers created a need for digitization with the administrative purpose of simplifying the financial information to stakeholders (Güney, 2014).

The manual work was significantly reduced, and new opportunities arose in the area of accounting due to use of accounting software for writing, calculating, logging, and many other tasks. Digitalization became important to improve the accounting process, but also regarding the storing and protection of accounting data (Jurubita, 2017). Also, the prices of available software and accounting applications have become more affordable. The same goes for the information access and its needs. Furthermore, the digitalization enhanced the security and increased the speed of data gathering in the accounting activities (PwC, 2016).

Automation is a highly debated phenomenon in the related profession of auditing, and there it can be connected with four concepts; Artificial Intelligence, Big Data, Cloud Accounting and Blockchain (Gotthardt et al., 2020). Artificial Intelligence can be described as a mix of software and equipment that replaces human intelligence in order to solve problems using learning, elucidating, reasoning and recognizing the same patterns as humans do (Askary et al, 2018). Artificial intelligence is the academic field of study where computers are machines being programmed to execute all the tasks way more accurately than the humans themselves. Also, computers in this field are able to self-learn and get better when tasks are being repetitive so there is really a learning experience. By all means, it is all

about the intelligent behaviour that the computer possesses. AI needs good-quality data in order to be able to learn and know how to function (CFB, 2018). The accounting processes that are usually taken by the Artificial Intelligence are most often the basic ones such as reporting of the data in terms of results and performance, purchasing and paying transactions, and record to report. These are usually chosen because they are more routine based and there is not a lot of complexity in their execution. As the time passes by, more and more processes will be "given" to the AI systems so they can become automated. The accounting tasks and processes that could benefit from automation e.g., accuracy and performance include: reporting, accounts payable and accounts receivable, maintaining supplier/customer data, validating and posting payments, creating/processing/delivering invoices, billing, period-end closing, general ledger accounting, cash management, inventory accounting, intercompany transactions and many more.

An Enterprise Resource Planning (ERP) system integrates several business domains of an organization in one by combining different business strategies with IT-supported solutions (Shtub & Karni, 2010). Possibly the most general definitions of all regarding the ERP software is that it manages all the available types of data in any organizations and of course its very own processes and practices. ERP systems can really include and combine a lot of different functions and departments such as HR, Finance, Operations, Sales, and Accounting to name a few. Accounting is very strict in terms of regulations and checks and this concludes many demands on the organizational level. This gives the opportunity to generate an accounting software in order to deal with these demands. An Accounting Information System (AIS) is a comprehensive software suite consisting of multitude elements that administer and report financial information (Wood & Sangster, 2007). AIS may belong to a larger system like an ERP suite (Roehl-Anderson, 2010).

Enterprise Resource Planning (ERP) systems have indiced a major transformation in the accounting industry over the past several decades (Kanellou & Spathis, 2013). When companies implement ERP systems and the accounting function is being included, then usually they end up more effective in terms of managing and maintaining the accounting data. The most famous benefits arising from the implementation of an ERP system would be faster and easier collection of the accounting data; reduced time required for producing financial statements; monthly, quarterly and annual accounts could be closed sooner; more flexibility in creating reports; reduction of accounting personnel (Kanellou & Spathis, 2013).

Having in mind the aforementioned, the purpose of this paper is to describe the change and transformation of accounting process in the digital world. We will hereby explore the impact of AI and ERP on the automation of accounting processes, to determine whether the automation of accounting processes has increased performance results and productivity of Macedonian enterprises, to pinpoint the digitalization challenges and to find out if companies were reluctant to the accounting process automation.

This paper is organized in five sections. The first section introduces the aims and relevance of this research. Section two explains Impact of Artificial intelligence and ERP on accounting, the benefits and downsides to accounting automation. Section three analyses the use of AI and ERP systems in firms in North Macedonia. Section five concludes the article.

2. IMPACT OF ARTIFICIAL INTELLIGENCE AND ERP ON ACCOUNTING

2.1 Artificial intelligence and accounting

Artificial Intelligence is a very broad area that covers number of technologies that are different but somehow interconnected among themselves. Such examples include speech and image recognition, data mining, semantic analysis, and machine learning. However, the literature does know only a small portion of it because in general, Artificial Intelligence is still in very early days of adoption by companies around the world and the broader society and community as well. One reason for the slow adoption of this phenomenon may be the cost which is related to the adoption because it is definitely not cheap. But it is not only because of the increased cost in installing, but also the lack of technical know-how, only because it is a fairly new area that companies are dealing with. AI and robots are essential for the advance of multiple economy sectors that can benefits citizens. Hence, in order to promote progress, governments should consider supporting innovation by not taxing new technologies (Chand et al., 2020). To encourage adoption, the benefits of using AI and Robotic Process Automation (RPA) tech should outweigh the disadvantages and installation costs that this kind of inventions may bring.

AI and RPA are two distinctly different technologies, but they also happen to be closely-knit phenomena that have had and probably will continue to have significant impact on the automation of the accounting processes and practices. If we put these two techs on an intelligent automation field, they would appear on the two opposite sides of the equation. Automation as a term has been quickly changing into a data-driven direction, and not so much a process-driven direction. Although RPA is highly process driven (automating rule-based tasks), AI needs good-quality data to be able to learn and know how to function (CFB, 2018).

The processes most often chosen for RPA are internal performance reporting, purchase-to-pay, and record-to-report, as they are usually routine-based and do not require complex decision-making and judgment (Embracing robotic automation during the evolution of finance, 2018). Robots are projected to replace humans in manual bookkeeping and aid them in multifaceted, complex processes (Professional accountants – the future: Generation Next, 2016).

AI is considered as a revolution that can definitely improve the area of accounting and put it forward in terms of making more qualitative decisions and creating better reports. Accounting practice has a history of using artificial intelligence (AI) for more than 25 years (Greenman, 2017). Machine learning models, AI enhancements applied to data or other AI developments can complement human thinking, be used to mitigate fraud, human error, and improve the accuracy of accounting functions (Greenman, 2017). This is probably one of the greatest benefits that could pertain to the accounting profession.

Both RPA and AI have huge impact and effect on the automation in the accounting industry. Repetitive and mundane tasks usually done by junior staff will be replaced by robots and human expertise will be needed at a higher level for decisions that require judgment (Gotthardt et al., 2020). As ERP systems are getting more and more developed with

the time, the demand for corporate governance and even more control in these kinds of systems will definitely increase. Artificial Intelligence can have impact on the accounting in multiple ways, such as:

1. Avoiding the Possibility of Financial Fraud

In the traditional accounting, work positions of the employees are not separated in the accounting department, especially in small organizations. For example, all finance workers can have access to bookkeeping and cash flow, and if these workers use this information for the benefits of themselves, it could easily lead to financial fraud. Therefore, with the impact of artificial intelligence, many accounting and related tasks will be managed by computers, and the only thing for the accounting workers would be to review the whole process. The computer system is automatically operating and executing the trial balance. In the accounting system, each accounting personnel has unique privileges (fingerprint scanner, retina scanner, etc.), and has different passwords and accounts, a clear separation of responsibilities, so to a certain level, this reduces the possibilities of financial fraud (Le Clair, 2017). The accounting system, however, still cannot stop financial fraud from happening completely because systems still need human personnel to control it, but it's a great start especially because digital footprints can be tracked and monitored and this is all thanks to artificial intelligence (Le Clair, 2017).

2. Improving the Quality of Accounting Information

In the traditional accounting, the employees are manually executing tasks related with registration of accounting books, making accounting vouchers and even formation of statements. All of this involves a lot of human effort, time, financial and material resources. Additionally, accomplishing tasks will not follow the scheduled timework, and for the tasks to be completed on time, an overtime working will be needed. This means long hours of work, fatigue, and mistakes. Lastly, all this results in distortion of accounting information and low efficiency. Seen from the other side, if the organization uses AI solutions for the financial procedures and tasks, it will save a lot of time and effort, and will improve the efficiency of the work. The only thing left to do for the accountants is to input the needed data, and the computer will do the rest of the process. As for the financial workers, they will only need to do the auditing. Even though, errors could occur when the accounting personnel tries to input the necessary data, the system will automatically report the error as a wrong data entry, which can be corrected to improve the quality of the accounting information (Le Clair, 2017).

3. Promoting the Reform of Traditional Accounting and Auditing

In the traditional accounting, the job portfolios for the accountants are matching a division of the business process, but with the inclusion of artificial intelligence, this will lead to a change in the method of separation of traditional accounting and auditing work (Perrier, 2018). This reform will improve work efficiency greatly and help accounting personnel to improve their own workability and quality, optimize the structure layout, optimize the setting of accounting posts, and change the traditional financial and practical working

modes (Perrier, 2018). As the application of AI in the accounting industry becomes more extensive, the need for employees is decreasing, which also implies an important change.

2.2 ERP and accounting

ERP systems are integrated software packages that enable companies to combine various business units of different areas such as production, sales, marketing, finance, human resources creating a tightly integrated system with flow of information across the entire business (Raymond et al., 2005). Over the past few years, companies around the world have implemented enterprise resource planning (ERP) systems since the utilization of ERP systems has been considered as a key determinant of competitive advantages (Dezdar, 2017). ERP systems are widely used by all kind of companies and in any type of industry nowadays. They are also very popular. The objective of the ERP system is to collect sufficient information on the operation of the organization to ensure the number of resources including financial resources, human resources, materials, machinery, etc., which meets the requirements of companies, through the use of planning tools and detailed planning (Davenport & et al., 2004). ERP systems have significantly changed the way how business data is collected, stored, disseminated, and used. This change in information processing orientation affects the accounting process (Sutton, 2006). Installing ERP system by companies worldwide only leads to different kind of benefits and advantages and these are also seen in different aspects of the businesses. In recent years, Viet Nam's construction enterprises (VCEs) have made great achievements and important contributions to the country's socio-economic development (General Statistics Office of Viet Nam, 2019).

There are multiple factors that are potentially causing the organization to implement the ERP systems. These factors can be technical and business reasons. The most frequent motivation for ERP implementation is to replace the old legacy system, the Y2K problem, the need for a new integrated system, and the ease of upgrading to new versions, the need for a common financial strategy and vision throughout the organization, or the need to have a common system with a newly acquired company (Velcu, 2007). In some companies, the three most popular reasons for adopting ERP systems are increased demand for real-time information, information for decision making and integration of applications (Poulymenakou & Borotis, 2005). Initial motives in the adoption of ERP in e-government, classifying them into four categories:

- technological motivations (have to do with infrastructure),
- operational motivations (concern the improvement of processes),
- performance motivations (are contingent on the will to improve results) and
- strategic motivations (are linked to a change in orientation in the design and delivery of services (Booth, Matolcsy & Wieder, 2000).

ERP users seem to be highly satisfied with reporting and decision support for finance and financial accounting, but they are less satisfied for transaction processing (Granlund & Malmi, 2002). They found that ERP systems have only a small effect on the use of new management accounting practices that emphasize sophisticated manipulation of information (Granlund & Malmi, 2002).

ERP suites evolved from advanced manufacturing technologies (AMT) with the goal to improve quality in customer service and manufacturing, as well as to decrease inventory levels (Huang & Palvia, 2001). Issues like the transition to the new millennium and currency consolidation, the need for function and process integration across departments, and Internet interface provide further motives for ERP adoption (Scott & Kaindl, 2000). ERP transactions are part of the inter-connected processes that comprise the business. These solutions enable business process integration and real-time data sharing across multiple departments. This all-inclusive informational system is capable of generating tremendous benefits to organizations via increased effectiveness and efficiency in operations, business processes and strategic decision making (Hayes et al., 2001). The accounting department plays a crucial role in organizing and redistributing resources to maximize the organizational output.

2.3 Benefits and downsides to accounting automation

Researchers have examined the prerequisites for successful accounting automation characterized as environmental (external) and organizational (internal) (Huang & Palvia, 2001). Organizational culture is associated with digitalization implementation problems, but national culture is not. Ergo, companies need to be aware of the stakeholders involved since violating their respective norms can cause troubles in the implementation. Therefore, the trust within the employees of the company and also between the company and associated sides is of huge importance. In essence, overcoming behavioural problems and particularly employee resistance to change would require a careful planning of a digitalization strategy (Aladwani, 2001).

The automation of the accounting brings both advantages and disadvantages. The biggest benefit that accountants are enjoying with the implementation of automation is the time saving, which is the most precious resource, and this makes the whole process more efficient and flexible (Ghasemi et al., 2011). It is also stated that automation in accounting, along with the time saving, is reducing costs and increasing productivity (Lee & Tajudeen, 2020). Additionally, several other authors believe that automation creates higher efficiency and effectiveness when it comes to working processes in accounting (Cooper et al., 2019). Accounting systems contain several control systems that minimize mistakes made by humans and enhance the accuracy, which leads to another advantage with automation (Ghasemi et al. 2011).

Due to automation, the job of the accountants can become more specialized and narrowed. New technology makes it possible for the computers to execute parts of the whole accounting process, which leave more available time for the accountants to focus on tasks like analyzing the results and the financial situation of the company (Bhimani & Willcock, 2014). Since automation creates possibilities for accountants to analyze for example the financial statements, the quality of the financial statements increases which in turn leads to increased reliability (Lupasc, Lupasc & Zamfir, 2012).

On the negative side, the automation process of accounting may create a knowledge gap between accountants (Güney, 2014), since this process brings new working methods, which require new skills and knowledge. Thus, an attitude gap arises between accountants

(Hunton, 2002). Additionally, it is also necessary for the accountants to be adaptable and flexible to new technology which is changing every single day. The attitudes towards technological changes and the understanding about what the changes entail along with the possible benefits are important since the technological changes affect the efficiency of the work process (Murtagh et al., 2015). Therefore, the behavior of the worker is essential for the automated processes to fulfill its capacity and live up to expectations.

Another big challenge that comes with the process of automated accounting is its dependability on the Internet. If there is disruption of the Internet connection, the accounting process is disrupted as well. There is another challenge that comes with the process of automation - the loss of control over the accounting data, as handling tasks manually is significantly decreased. Over the last decade enterprises operating on the global market (earning more than $ 100 million in annual revenue) have significantly reduced the costs associated with financial services, performed within shared services centers (Jablonski & Ziebicki, 2019). This has been achieved by automation of processes and tasks, including manual handling of accounts, accounting transactions and customers. Funds saved in this way are spent on employment and developing accounting team members, responsible for planning, cost analysis as well as identification of efficiency models (Jablonski & Ziebicki, 2019).

The increased level of automation in the department of accounting is one of the factors for downsizing and offshoring decline. The way this is going and the pace it is having, there would possibly appear even more and worse unfavorable trends on the labor markets around the world which will eventually results in increased levels of unemployment. KPMG forecasts that, over the next 15 years, from 45% to 75% of the present work posts in financial offshoring centers will be eliminated through process automation. Savings in such centers' operating costs are estimated on a similar level (KPMG, 2016). A similar research indicates that 47% of all the employed in the U.S. economy are in the high automation-related risk group (Osborne and Frey, 2013). Because of the rapid automation and standardization of processes and tasks, the professions they practice as accountants may be extinct. For comparison, this percentage also ranks relatively high for other economies, e.g., in Finland – 35%, Norway – 33%, Europe 54%, Singapore 25% (Pajarinen et al., 2015). It is estimated that no more than 5% of all the professions can be automated completely using current technologies, on the other hand, at least 30% of the tasks are subject to automation on approximately 60% of all work posts (McKinsey Global Institute, 2017). In particular, data gathering (64% automation potential and 17% of the working time in the economy) and data processing (69% automation potential and 16% of the working time in the economy) are performed almost in all the sectors and most frequently consist in: administering human resources, payroll, transaction data; placing data in insurance, credit, bank, health institutions' forms (McKinsey Global Institute, 2017).

A significant barrier in the implementation of such solutions can refer to the cultural aspects, especially on the part of the managers, who have become accustomed to managing large teams of people (KPMG, 2016). Additionally, studies have illustrated relatively high concerns and at the same time low level of trust (or no trust at all whatsoever), related to the application of automated processes to personalized, complex tasks (Nagarajah, 2016).

Yet another barrier may be the wrong process or task being prioritized for automation. This can cause serious disruption in the ongoing operation on day-to-day basis. Bots can

create exceptional situations that need to be handled manually and eventually it can be a situation where the elimination of the bottleneck can cause serious problems that nobody anticipated and the cost reduction can appear to be less than expected (Kirchmer, 2018).

Therefore, even though AI and ERP can help automatize processes, enable cost efficiency and promote competitiveness, we cannot disregard their drawbacks. So, this article seeks to assess the accounting procedure modifications related to digitalization, the incentives behind AI and ERP implementation, as well as the perks and drawbacks that the change may impose.

3. THE USE OF AI AND ERP SYSTEMS IN FIRMS IN NORTH MACEDONIA

3.1 Research questions and methodology

The empirical evidence is expected to shed light on the impact of ERP systems and AI technology on the accounting processes. We also seek to explore whether the automation of accounting processes using AI or ERP have helped or hindered the execution of various accounting tasks, to pinpoint the challenges in automating accounting procedures and to find out if companies were reluctant to accounting automation.

Our research on this topic in North Macedonia has indicated that it is largely underexplored. After a careful consideration of the available literature and evidence, a survey was structured as a data gathering method. The literature review helped in finding the reasons for implementing Artificial Intelligence and ERP in order to automate the accounting processes, the advantages that follow with their implementation and all the required changes that were brought with them. Moreover, some of the elements and factors to consider in relation to automation of accounting process were drawn from Gustafsson and Jerkinger (2021). The study of Spathis and Konstantinidou (2004) helped in forming the questionnaire and also the research question about the impact of ERP software on accounting processes.

The questionnaire form includes multiple choice questions, open ended questions and one question on a seven-point Likert-type eliciting respondents' attitudes on the extent of the impact of ERP systems and AI technology on accounting processes. Using systematic sampling, the questionnaire was e-mailed to finance professionals from various companies in different sectors in North Macedonia that do have implemented ERP and/or AI technology in the accounting processes. The companies were targeted via LinkedIn, using the Sales Navigator feature. As is one of the first studies on this topic in North Macedonia, and having in mind that the results will be posted and interpreted objectively, the empirical evidence will be of significant importance for existing literature and may be used as base for all related future research.

3.2 Research results

Sample description

The survey was conducted in the period from 05th November until the 31st of December 2022. Two reminders were sent to the companies, one at the end of November and the other in the middle of December. The questionnaire that was delivered to 100 firms operating in North Macedonia in different industries and sectors. 43 complete responses received, constituting a 43 percent response rate.

80 percent of the respondents have a managerial position in their respective firm. This is as expected, since the introduction of ERP and AI is still considered an innovation in the process of automating the accounting procedures, and it is more likely that a more experienced person will take over the challenge. It is expected that after a while, employees across all levels will adopt ERP or AI, following initial training and knowledge sharing. The gender representation of respondents was balanced.

The most represented sector is IT with 45 percent, followed by Finance (30 percent), Marketing (15 percent) and Telecommunications (5 percent). This is not surprising given that IT and finance industries have experienced a considerable boom over the last decades, while relying greatly on technology. This was especially true with the onset of the pandemic in 2019 when these industries continued operating without major disruptions as was the case with the Covid-sensitive industries. The product offerings go hand in hand with the industry the company operates in, with technological solutions experiencing a peaked during the pandemic years. As specified by the respondents, their main products are of financial and IT nature in terms of customer service. Many focus also on B2B solutions (more than 90 percent), with B2C solutions rarely on the horizon.

Further, the majority of the firms are medium-sized (60 percent), 30 percent are large entities with over 250 employees, while the remainder (10 percent) are micro and small enterprises (up to 50 employees). This distribution was expected as the bigger the company, the more revenue the higher the chance to adopt ERP system or AI technology finance automation purposes. The implementation costs cannot be disregarded. In addition, only 3 enterprises are listed on the Macedonian Stock Exchange. 65 percent of the firms are in foreign the ownership, as is the case with the majority of IT and Finance firms operating in North Macedonia.

While all the respondents use ERP, mere 30 percent have implemented AI technologies. As for the accounting software in use, most respondents rely on Oracle and SAP (70 percent), with an equal distribution for Xero and QuickBooks (15 percent each). This corresponds with our sample population as SAP and Oracle have a consistent adoption by larger businesses. Lastly, 57 percent of the entities have been using ERP systems for 5 years or longer, which gives plenty of time to accrue benefits from the system introduction. We can therefore conclude that Macedonian entities do follow the global trends in terms of software selection and company-wide adoption.

The impact of ERP and AI technology on accounting processes

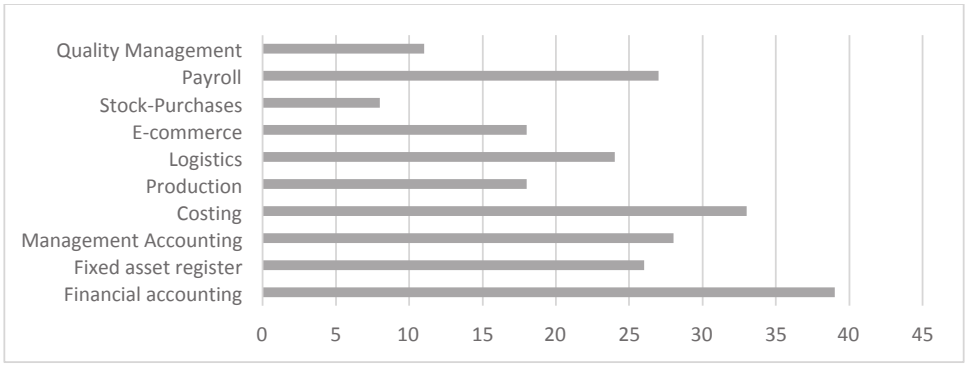
The remaining research results will be presented in two sub-sections. The first sub-section will provide the findings related to the first research question: impact of ERP solu-

tions on accounting processes, benefits and drawbacks from ERP in relation to various accounting tasks, implementation challenges and readiness to embrace accounting digitalization via ERP. The second sub-section continues to elaborate the findings related to our second research question: impact of AI technology on accounting processes, benefits and drawbacks from AI in relation to various accounting tasks, implementation challenges and readiness to embrace AI in accounting.

ERP implementation analysis

Figure 1 indicates that ERP has been mostly used for Financial accounting, Managerial accounting, Payroll, Costing and Fixed Asset Register. Evidently, the least used module is Stock Purchases, which may be the results of poor system interconnection with suppliers or the reluctance to establish one due to lack or supplier availability or reliability.

Figure 1. Usage of ERP modules

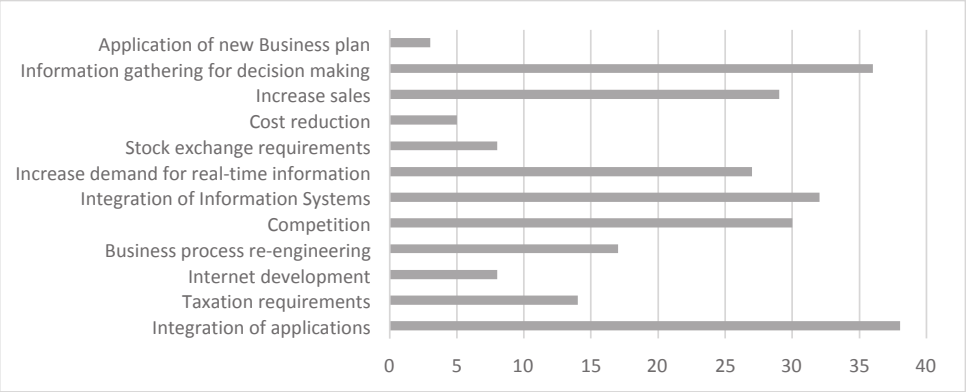


Source: Own analysis

These results are aligned with Spathis and Konstantinidou (2004) who found that in the Greek market the adoption of financial and managerial accounting ERP features ranks high. Hence, accounting procedure automation is of primary importance upon ERP implementation. The sole major difference between the two neighbouring markets is in referral to the purchases module.

As in Spathis and Konstantinidou (2004), the main reasons ERP has been adopted and implemented in the companies that answered the questionnaire is the system integration, real-time information gathering for decision making purposes, as well as sales increase (see Figure 2). It can be noted that these activities are prerequisite to gaining competitive advantage and beating competition which also appears to be one of the main reasons for using these systems.

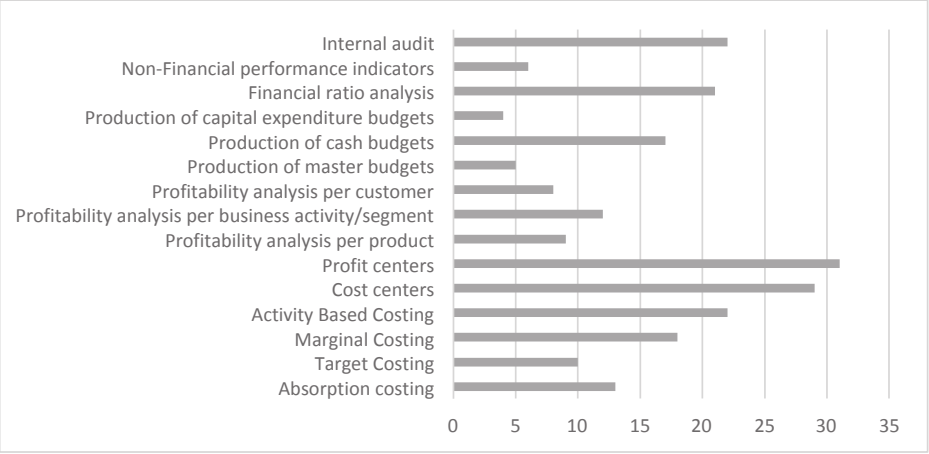
Figure 2. Main reasons for adoption of ERP



Source: Own analysis

Upon adoption, the respondents answered that they use the new ERP system for different costing activities, such as marginal, absorption and activity-based costing. Once embraced for financial and managerial accounting purposes as an a-priori activity and real time information gets gathered, analysed and communicated properly, profit and cost centers come to the attention of company executives given the need to track actual versus planned activities per business unit and to better understand the business opportunities and challenges. As expected, and given the cross-functional and cross-application integration benefits, the internal audit module is also frequently used by the respondents. Financial ratio analysis, although maybe more of a finance function is still used widely and as a tool to predict and forecast the success of a certain product or feature (see Figure 3).

Figure 3. Usage of ERP after the implementation



Source: Own analysis

In the Greek market, the internal audit, non-financial performance indicators and profitability analysis per business activity/segment have seen the highest percentage of usage post-ERP implementation (Spathis & Konstantinidou, 2004). Given that North Macedonia is a developing market where non-financial performance indicators such as ESG are still at the recommendation as opposed to legally-binding reporting stage, we can understand some of the discrepancies in the results of the two surveys. That is, the ERP post-implementation use in Greek firms has gone beyond the traditional accounting features given the EU market and legislative integration of the country.

As for the benefits from ERP in accounting processes (see Table 1), the highest mean values indicate that system introduction has helped achieve efficiency in payroll processing, report quality and improved decision making based on data gathering flexibility. The lowest scores are accorded to reduction of accounting personnel, working capital control and reduced transaction processing time. Hence, the introduction of ERP does not necessarily mean letting go of key accounting staff and substituting human intellectual input with systems or robots.

Table 1. Benefits from ERP in accounting

	Mean	Median	Max	Min	N
Expeditious closure of monthly accounts	4.37	5	7	4	40
Expeditious closure of quarterly accounts	4.12	5	7	4	38
Expeditious closure of annual accounts	5.13	5	7	4	33
Expeditious transaction processing	3.8	4	5	1	28
Expeditious report issuing	5.57	6	7	5	37
Upgraded report quality	6.39	7	7	3	29
Upgraded decision-making process	6.2	7	7	3	34
Upgraded internal audit function	5.55	6	7	2	40
Upgraded working capital control	2.17	3	5	1	21
Upgraded financial ratio analysis	6.1	7	7	3	40
Reduction of time for issuing payroll	6.66	6	7	5	39
Accounting department downsizing	2.5	3	5	1	19
Flexibility in collecting information	6.19	7	7	5	32
Accounting applications integration	5.23	6	7	3	30
Quality decisions using timely and reliable data	6.32	7	7	5	35

Likert scale: 1 = none; 2 = very low extent; 3 = low extent; 4 = average; 5 = high extent; 6 = very high extent; 7 = impeccable

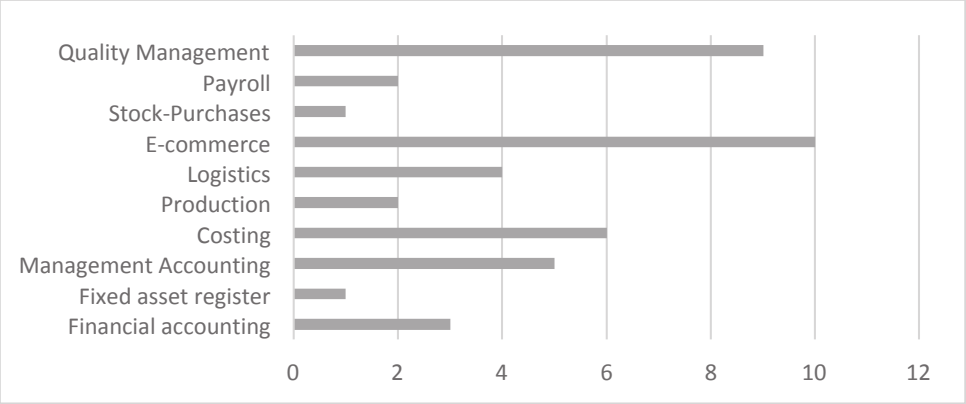
Source: Own analysis

The biggest difference to Spathis and Konstantinidou (2004) appears in the domain of payroll, which, as explained by the authors, is likely due to the early ERP implementation stage in Greece at the time of the survey.

AI implementation analysis

Given the 30 percent AI tech implementation rate and 2-3 average years of usage, AI is considered as a newer technology or somewhat riskier which is why it is usually implemented after ERP has been installed.

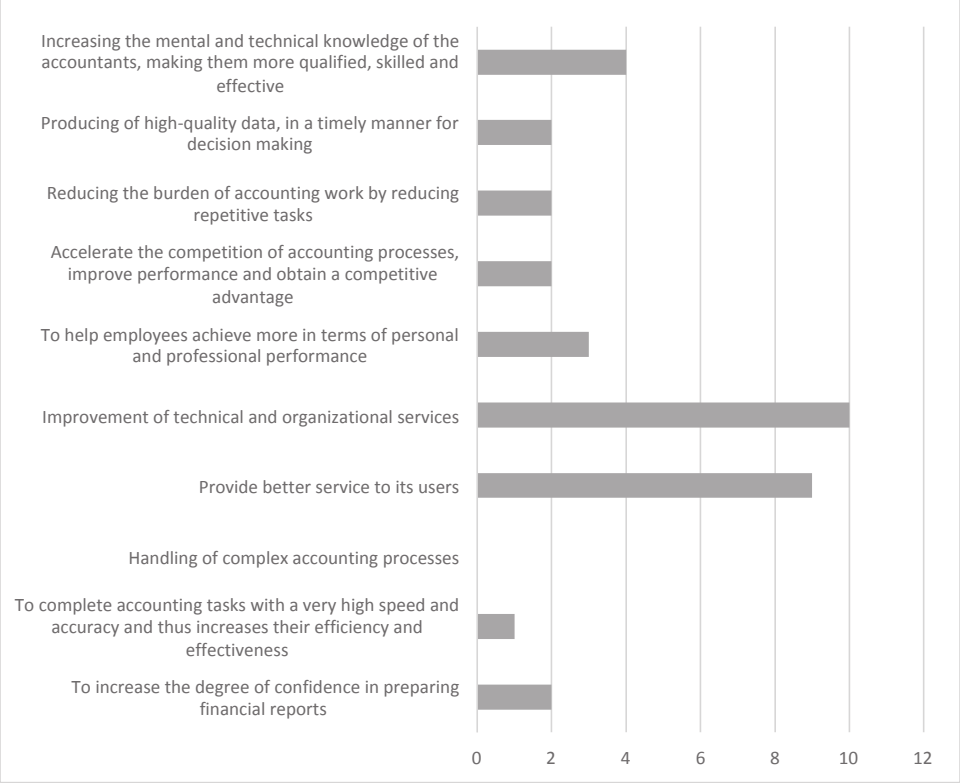
Figure 4. Usage of AI modules



Source: Own analysis

The two most preferred AI modules are E-commerce and Quality management (see Figure 4). AI has a distinct role in e-business as it eases the examination and understanding of customer behaviour patterns and boosts the buyer experience. AI tools aid business in service/product recommendations through chatbots and personalized promotions, while steering customer preferences towards particular brands (Fedorko et al., 2022; Bawack et al., 2022). Now, the similarities with the ERP as a system are that AI has been least used for Inventory management/purchases which pinpoints the marginal effort in trying to connect with suppliers using technical interfaces. This may be due to supplier lack of technical readiness or funds to engage in interface development, lack of trustworthiness, reliability or even availability.

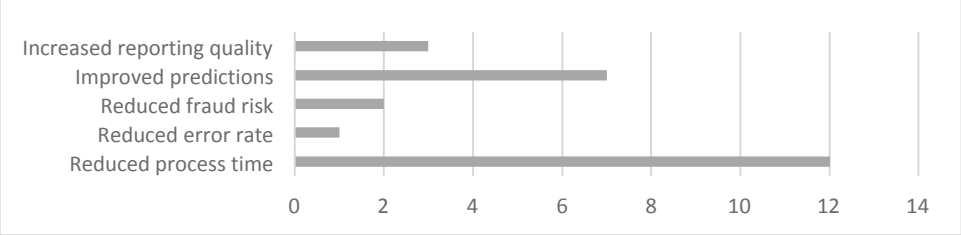
Figure 5. Usage of AI technology



Source: Own analysis

As depicted in Figure 5, AI is not used at all for complex accounting procedures mainly because it is a relatively novel technology and in the early stages of adoption on the Macedonian market. Hence its application in the least complex accounting processes to get acquainted its possibilities, acquire technical know-how and reduce the burden of repetitive tasks. It can be concluded that AI is not much used for accounting driven tasks as it partakes in the improvement of tech and organizational services. This outcome can be related to the acceptance of AI in e-business where it revolves around personalisation, user optimisation and recommender tools that help create a better user experience and a better service for customers (Bawack et al., 2022).

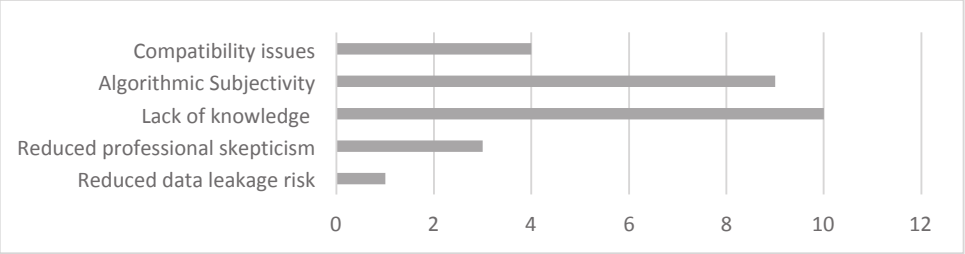
Figure 6. Main benefits of AI



Source: Own analysis

Figure 6 shows that the main benefits of AI are the reduced process time and to some extent the improved predictions. This is not surprising because it seems like AI is used mostly to try and complete the processes in a much quicker pace and thus free up some human resources aka manual labour work. Thus, acquiring AI systems that surpass the analysis speed of existing ones is the core orientation in AI preference. In addition, improving reporting quality and predictions via advanced AI algorithms seems to be of high importance to AI users.

Figure 7. Main disadvantages of AI



Source: Own analysis

When discussing disadvantages (Figure 7), it is clear that the top challenges lie within algorithmic subjectivity and lack of knowledge (or even rushed conclusions), a feature emphasized by Jin et al. (2022) and Kumar (2021). The lack of knowledge is somehow clear and understandable as AI is considered a novelty and is continuously changing, so it will take some time for companies to grasp. Regarding the algorithmic subjectivity, the tech needs time and data feed in order to train by itself and improve output accuracy. AI in accounting may reduce transparency due to the use of complex algorithms while impeding on data privacy (Jin et al., 2022) given the access to sensitive information. This can ignite data breaches and wrongdoings that are too complex to detect or verify, especially given the current regulatory gap.

Table 2. Benefits from AI in accounting

	Mean	Median	Max	Min	N
Expeditious closure of monthly accounts	0.3	1	2	1	7
Expeditious closure of quarterly accounts	1.1	2	4	1	5
Expeditious closure of annual accounts	0.7	1	3	1	10
Expeditious transaction processing	2.7	3	5	1	8
Expeditious report issuing	1.9	2	4	1	6
Upgraded report quality	3.4	4	5	1	11
Upgraded decision-making process	2.6	3	5	1	9
Upgraded internal audit function	1.2	2	4	1	10
Upgraded working capital control	0.8	1	2	1	10
Upgraded financial ratio analysis	1.2	2	4	1	7
Reduction of time for issuing payroll	2.3	3	5	1	5
Accounting department downsizing	0.2	1	2	1	8
Flexibility in collecting information	1.7	2	4	1	6
Accounting applications integration	1.5	2	4	1	5
Quality decisions using timely and reliable data	2.5	3	5	1	10

Likert scale: 1 = none; 2 = moderate extent; 3 = average; 4 = high extent; 5 = impeccable

Source: Own analysis

As we can infer from the answer ranking, the AI scores have lower averages given that AI is more novel and costlier than ERP. In line with Jin et al. (2022), the most highly rated perceived benefits of AI technology are faster transaction processing and improved decision-making based on timely and reliable data (see Table 2). These findings correspond with the extensive use of algorithms that this technology is based on which enable it to learn from previous experiences and eliminate time hurdles that are often the case with manual and human-driven processing activities. As it is in the early stages of adoption and know-how is lacking, plenty other benefits have not been attained yet but will start streaming in as human resources are freed up from repetitive and technical tasks and re-allocated to more strategic purposes.

4. CONCLUDING REMARKS

This paper assesses the impact of AI and ERP on the automation of accounting processes, by determining whether it has increased performance results and productivity of Macedonian enterprises, identifying the challenges in accounting digitalization and inspecting whether companies were reluctant to accounting automation. The empirical analysis certifies that the accounting practice has already been altered by the tech-enabled task automation. As a result, accountants are more efficient in terms of information quality, layered reporting and

reduced decision-making time, as evidenced by prior research (Lee & Tajudeen, 2020; Cooper et al., 2019; Le Clair, 2017). However, given the early digitalization stage of the majority of respondents, not a big portion of day-to-day tasks has been automated until now and that businesses carefully consider the outcomes before automating a particular process or activity. Therefore, some of the respondents indicated the need for a greater automation in the future considering the benefits of automation. Also, given the early implementation stage, it takes time for the advantages from using AI or ERP to outweigh the disadvantages.

Furthermore, the professional accountant role has shifted to consulting and educated decision-making, as confirmed by Gotthardt et al. (2020). Our respondents perceive this alteration as beneficial since numerous repetitive and technical tasks are now part of the scope of ERP and AI solutions.

The current study contributes to the existing accounting digitalization research in three major ways. Firstly, companies can benefit from accounting process automation as it helps provide timely and flexible accounting information for decision-making. Secondly, and as suggested by Chand et al. (2020), policy makers can focus their tax release efforts and government support programs towards helping businesses digitalize, train and repurpose their workforce from technical and repetitive duties to qualitative assessment and decision-making. Lastly, educational institutions need to integrate ERP and AI systems in their accounting modules so that graduates will enter the working environment equipped with skills needed to operate with novel technology. Nonetheless, this study has its limitations. Namely, to further enhance the conclusions, a recurring market assessment may produce better information for decisions makers as it would enable for observation of time variances in ERP and AI suite implementation, the related drawbacks and benefits for companies.

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