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REVIEW

Enhancing Business Competitiveness through Accounting Digitalization

Mejora de la competitividad empresarial mediante la digitalización de la contabilidad

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ABSTRACT

Introduction: amid rapid changes in the external and internal environment of modern business, more and more companies are turning to the introduction of the latest digital technologies to improve their accounting systems. This helps to increase the efficiency and accuracy of processes, as well as reduce the cost of routine work. However, the use of modern digital tools in accounting also involves certain risks and limitations, as well as raises questions about the ability to use the data for further management decision-making. Given the proven relevance of the topic, the purpose of the study can be defined as identifying key digital tools for the development and improvement of accounting to ensure the competitiveness of modern business in the long term.
Method: to obtain the results, the author used general scientific methods of analysis, synthesis, systematisation, processing of statistical material, generalisation and specification, as well as a specific method of hierarchy analysis, which allowed to identify the most optimal areas of accounting optimisation for a modern enterprise.
Results: the study identified the main digital tools that can be used in the field of accounting and their impact on the system of accounting procedures in the company. The possibilities of applying various digital tools were identified and it was found that they are necessary to increase competitiveness in the long term.
Conclusions: by applying the hierarchy analysis method, it is determined that the most promising for the development of the accounting system may be the tools for processing big data and using digital twins.

Keywords: Financial Analysis; Management Technologies; Accounting Automation; Business Efficiency; Digital Transformation.

RESUMEN

Introducción: en medio de los rápidos cambios en el entorno externo e interno de las empresas modernas, cada vez más empresas recurren a la introducción de las últimas tecnologías digitales para mejorar sus sistemas contables. Esto ayuda a aumentar la eficiencia y la precisión de los procesos, así como a reducir el coste del trabajo rutinario. Sin embargo, el uso de herramientas digitales modernas en contabilidad también implica ciertos riesgos y limitaciones, además de plantear preguntas sobre la capacidad de utilizar los datos para una mayor toma de decisiones de gestión. Dada la relevancia demostrada del tema, el propósito del

estudio puede definirse como la identificación de herramientas digitales clave para el desarrollo y la mejora de la contabilidad para garantizar la competitividad de las empresas modernas a largo plazo.
Método: para obtener los resultados, el autor utilizó métodos científicos generales de análisis, síntesis, sistematización, procesamiento de material estadístico, generalización y especificación, así como un método específico de análisis jerárquico, que permitió identificar las áreas más óptimas de optimización contable para una empresa moderna.
Resultados: el estudio identificó las principales herramientas digitales que se pueden utilizar en el ámbito de la contabilidad y su impacto en el sistema de procedimientos contables en la empresa. Se identificaron las posibilidades de aplicación de diversas herramientas digitales y se encontró que son necesarias para aumentar la competitividad en el largo plazo.
Conclusiones: aplicando el método de análisis jerárquico, se determina que las más prometedoras para el desarrollo del sistema contable pueden ser las herramientas de procesamiento de big data y el uso de gemelos digitales.

Palabras clave: Análisis Financiero; Tecnologías De Gestión; Automatización Contable; Eficiencia Empresarial; Transformación Digital.

INTRODUCTION

Digitalisation strategies are being successfully implemented around the world by IT and business leaders at all levels. It generates a technological shift, transforming the business environment in a short time, identifying new leaders, and making companies grow and increase their competitiveness in the market.

The first step towards digitalisation should be to change the company's business processes. It is necessary to study the weaknesses in current solutions and compile a list of shortcomings for their subsequent elimination, which will subsequently be used by the management when making decisions on business transformation to a more efficient one through the use of modern digital tools.[1,2]

It should be noted that business digitalisation is primarily necessary for companies operating in a fiercely competitive environment. For such companies, a delay in the digitalisation phase or refusal to do so may lead to a loss in the competitive environment. Digitalisation is especially important for companies that work with data and analyse large amounts of information.

Today, the cost of digital business transformation is high in any country in the world, but it justifies the costs in the first months after the introduction of innovations.[3] This is due to the reduction in the cost of traditional data processing system maintenance and the cost of working with different types of resources.

The importance of control in the digital economy is increasing due to the use of online media in the management of large databases. Control is an important functional element of any management system. In a corporate management system, internal control helps to identify and optimise inefficient business processes.

For modern companies, accounting is a significant indicator of economic policy and reflects a complete picture of their property and financial position.[4,5] According to the law, all enterprises, regardless of their form of ownership, are subject to the same requirements for accounting.

Qualified accounting can provide information not only about the structure of the company's property and financial position, but also reflect the efficiency of financial and economic activities and give an objective assessment of the business value.

Based on the above, in the current and rapidly changing economic environment, companies must be able to adapt to new ways of doing business in a short time.

Digitalisation, which is being actively implemented in all spheres of human life, involves improving the quality of interaction between all business entities, employees and managers, as well as accelerating all technological processes of an organisation's functioning. Many physical transactions that used to be carried out through face-to-face meetings and negotiations are now available on various digital platforms. As a result, digitalisation allows for the scaling, development and simplification of the interaction of resources in all industries, including accounting. Organisations whose information systems are more advanced are much better able to ensure their competitiveness in various markets, as the whole world is gradually striving to transfer all communications online.[6]

In the scientific community,[5,7,8] the idea that the gradual introduction of digitalisation in a company's business processes allows employees to use cloud storage, artificial intelligence, machine learning, social media and other software elements that allow them to stay in touch with potential customers and suppliers is being actively promoted. In accounting, digitalisation enables the use of digital technologies and speeds up the process of processing information and large amounts of data.

For each company, accounting is now a means of taking into account all financial opportunities of the

business.[9] Just a few decades ago, accounting was mostly done on paper, while today it is becoming one of the most actively digitised areas for modern business.

As noted in the literature,[10,11,12] companies are already able to implement digital accounting, which is an advanced process that allows them to transfer financial information using new digital methods and tools. As a result of the use of these tools, accounting is becoming more elastic and its digital capabilities are being integrated and improved every year.

There are also opinions in the scientific community[13,14,15] that for modern accounting, the digitalisation process opens up certain opportunities that can positively affect the competitive position of a business. The main areas of improvement of the accounting system through digitalisation include the following:

- facilitating the system of accounting and control of raw materials and supplies, especially in the presence of large warehouses or significant assortment diversity of stocks;[16]
- global optimisation of digital platforms and digital transformation of the entire business management system;[17]
- the possibility of automating the accounting and control system;[18]
- the possibility of reducing production and operational cycles.[19]

Today, many large and medium-sized companies are already familiar with electronic interaction, as process automation is no longer uncommon and new software products are increasingly used in the work of companies.

The most common digital products used in practice by accounting professionals are:[20,21,22]

- big data and predictive analytics;
- blockchain;
- optical recognition;
- digital twins;
- electronic document management;
- use of electronic signatures.

The specifics of the use of digital products and innovations in the field of accounting are shown in Fig. 1.

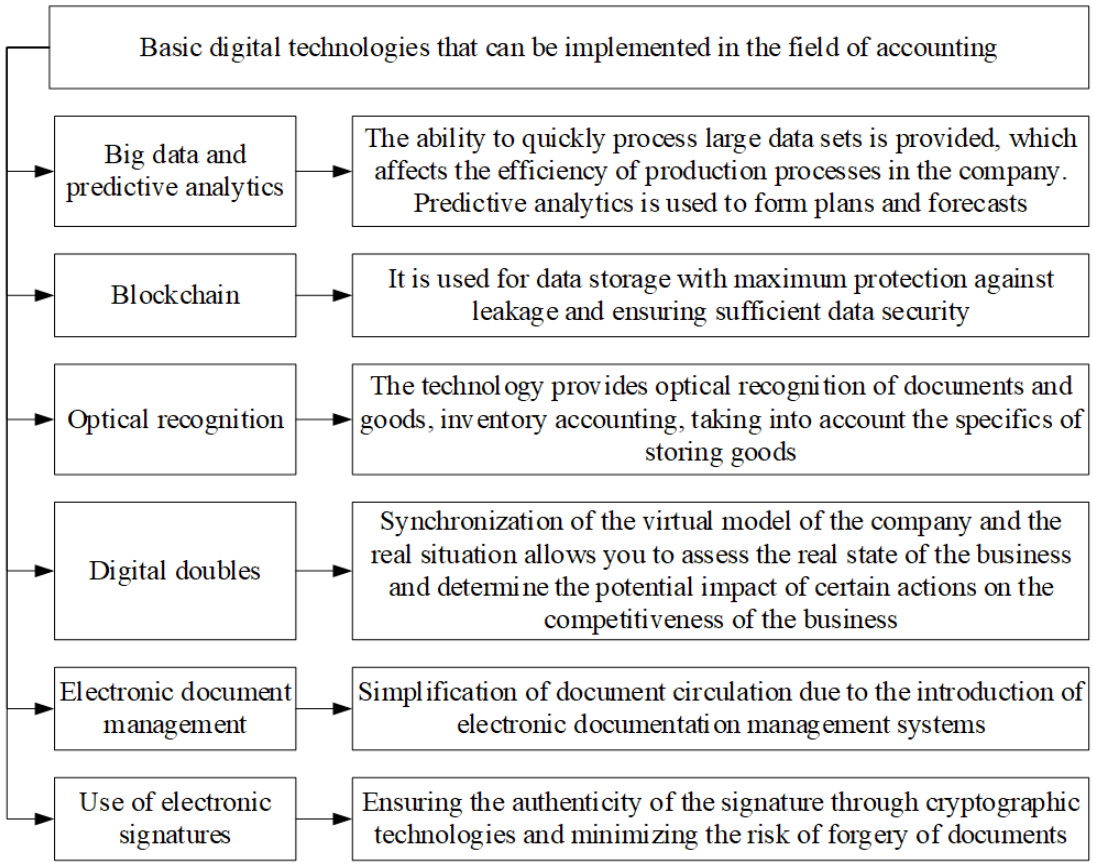

Figure 1. Summarising the basic possibilities of using digital technologies in accounting
Source: compiled by the authors based on[23,24,25]

Since one of the key indicators of business success is the growth of its value and competitiveness, which not only determines the long-term and sustainable functioning of the company, but also transforms into indicators of the socio-economic well-being of the entire society, the digital transformation of accounting should focus on

maximising business value and strengthening its competitiveness.

METHOD

In the course of the study, approaches to the introduction of digital innovations into the accounting system at an enterprise were generalised, with the potential impact of such transformations on business competitiveness determined. The study is based on the fact that due to rapid changes in engineering, technology and production organisation, the importance of managing the latest digital tools that can be used to develop the accounting system is growing.

Data Collection

Scientific sources for the study were selected by searching the main databases Web of Science and SCOPUS. It is worth emphasising that both databases are widely recognised as the most authoritative and allow for the selection of literature on a wide range of scientific issues. Attention was focused on scientific publications from the last five years to ensure maximum relevance of the material used, as the field of digitalisation is quite dynamic and requires analysis of the most up-to-date scientific base.

Search Limits

Based on a systematic review and analysis of the scientific literature, the groups interested in conducting the study were identified, including accountants, business managers and owners, financial directors, technical specialists, etc.

In the process of conducting the research and selecting scientific sources, the time period for searching the database was determined from January 2019 to April 2024 to better match the continuity and completeness of the research conducted over the past 5 years.

Data Analysis

The main specific research method is the hierarchy analysis method, which allowed to identify the most relevant digital tools for the development of the accounting system to improve business competitiveness. The hierarchy analysis method is a systematic procedure for a hierarchical representation of the elements that define the essence of the problem. The method consists in decomposing the problem into simple component parts and further processing the sequence of judgements of the decision maker by pairwise comparisons. As a result, the relative degree of interaction between the elements in the hierarchy can be expressed. These considerations are then expressed numerically. The method includes procedures for synthesising multiple judgements, prioritising criteria and finding alternative solutions. This approach to solving the problem of choice is based on the analysis of not only the effectiveness of decisions, but also the criteria by which decisions are made or rejected.

RESULTS

Digitalisation in the modern world is gaining momentum and is being implemented in various areas and industries, in different countries. According to the Global Innovation Index 2023, the most innovative economies in the world in 2023 were Switzerland, Sweden, the United States of America, the United Kingdom and Singapore, while the group of middle-income countries has deteriorated in the ranking over the past decade. Attention is also paid to countries exporting innovative technologies (figure 2).

As shown in figure 1, the most economically developed countries also respond positively to innovation opportunities and prospects. Accounting is no exception, as it is inherent in all areas of business, regardless of industry or market.

Digitalisation in the field of accounting is an innovation that will bring changes to accounting through new technologies and services.[27] Ways to improve digitalisation increase the efficiency and quality of accounting in enterprises. Changes in this area are reflected in the increased efficiency of the accounting department. The key effect of introducing digital technologies in a company is to increase productivity and reduce costs.[28] The greatest economic effect is expected to be brought to the company by the decision to create and develop big data analysis and predictive analytics, as this technology allows to increase productivity and bring the quality of human decisions to a new level. This is reflected in greater efficiency of customer interaction and better quality of planning.

The difference between digital accounting and the usual forms of accounting in the modern world is that the process of information transfer and processing is carried out using modern information technologies. However, it is necessary to define the criteria and main directions of digital technologies implementation in the field of accounting in order to increase the competitiveness of business in the long term. To combine these areas and criteria, the hierarchy analysis method may be the best method. It will help to systematise views on the specifics and prospects of accounting digitalisation.

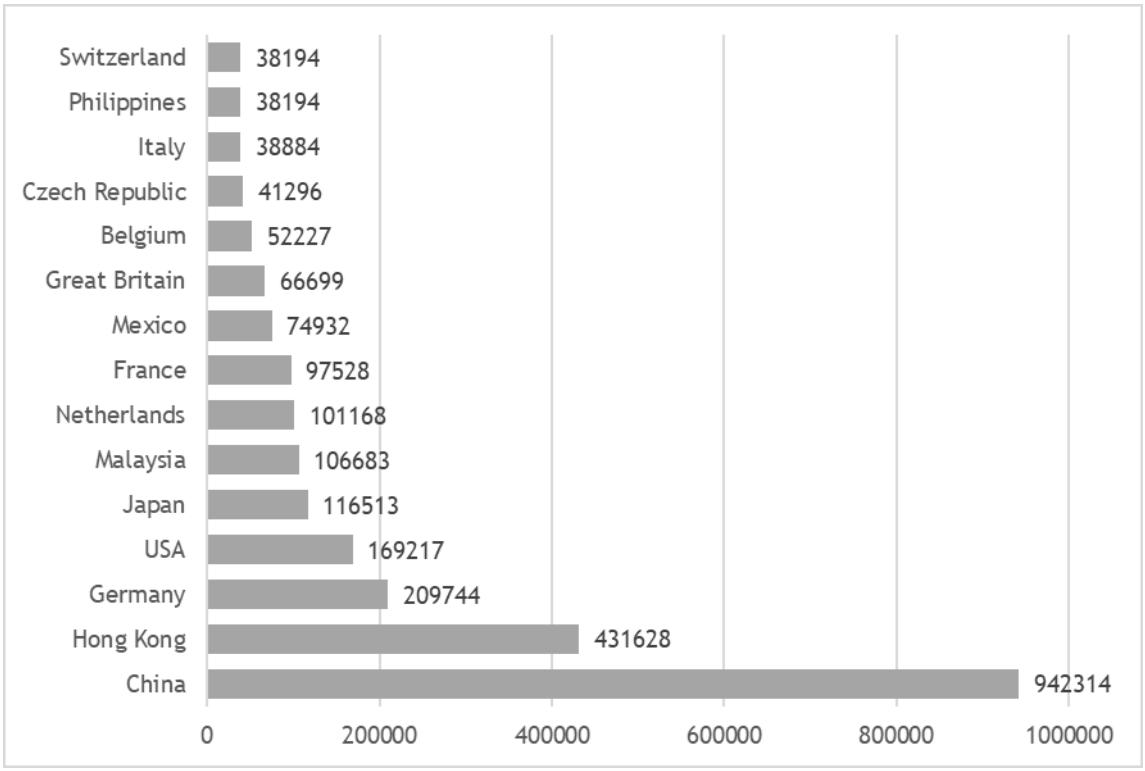

Figure 2. Exporting countries of innovative technologies in 2023 (billion USD)
Source: PitchBook Data [26].

Hierarchy analysis is a mathematical tool for a systematic approach to complex decision-making problems. This method allows you to structure a complex decision-making problem in a clear and rational way in the form of a hierarchy, compare and quantify alternative solutions. The hierarchy of determining the optimal directions of accounting digitalisation is shown in figure 3.

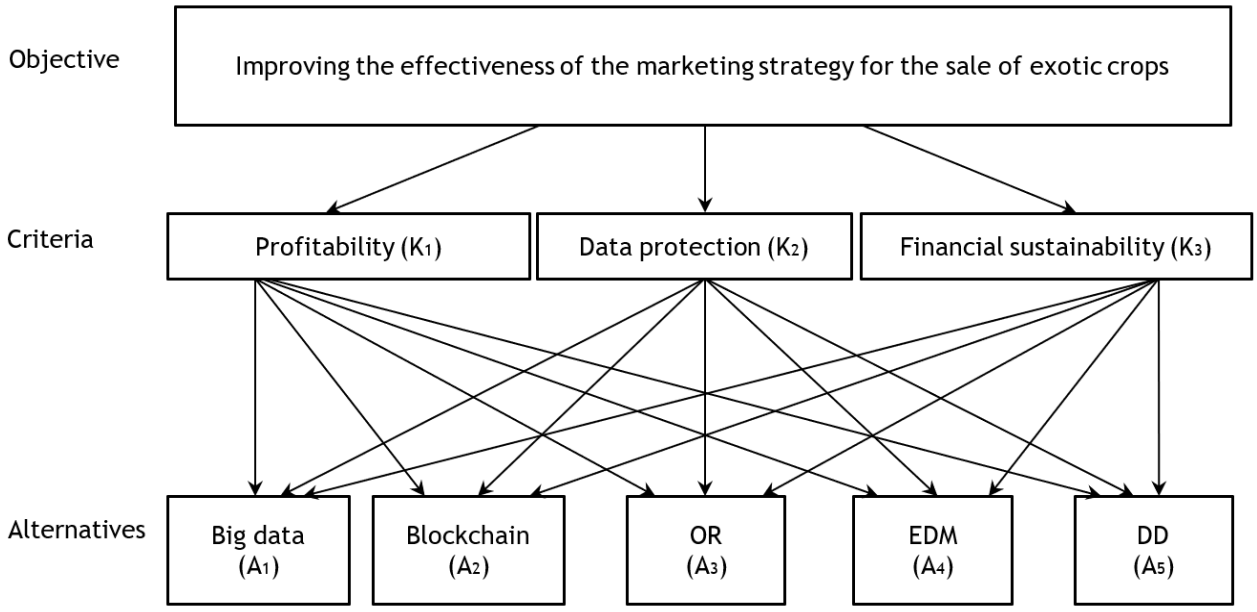

Figure 3. Hierarchy of decomposition of the task of selecting optimal tools for the digitalisation of accounting
Note: OR – Optical recognition; EDM – Electronic document management; DD – Digital doubles.

In accordance with the presented hierarchy, it is necessary to determine which of the alternatives is the most acceptable and optimal for each individual type of business. The calculation of priority vectors for criteria and alternatives involves filling in the matrices of pairwise comparisons, calculating the components of the eigenvector of matrices, the normalised vector of matrices, the consistency index and the consistency ratio

using the formulas (1) – (5).[29]

$$W_i = (a_{i1} \cdot a_{i2} \cdot a_{i3} \dots a_{in})^{\frac{1}{n}}; \quad (1)$$

$$W_{norm} = W_i / \sum_{i=1}^{n} W_i \quad (2)$$

$$\lambda^*_{max} = \sum_{j=1}^{n} a_{ij} \cdot W_{norm} \lambda_{max} = \sum_{i=1}^{n} \left(\sum_{i=1}^{n} E_{ij} \cdot W_i \right); \quad (3)$$

$$I_c = \frac{\lambda^*_{max} - n}{n-1} \leq 0{,}2; \quad (4)$$

$$OC = I_c / I_{cc} \quad (5)$$

where W – is the component of the eigenvector of the matrix;
W_{norm} – normalised vector of the pairwise comparison matrix;
λ_{max} – maximum eigenvalue of the matrix;
I_c – consistency index;
I_{cc} – average value of the consistency index;
OC – consistency ratio.

The relative importance of the criteria of profitability (K_1), data protection (K_2), and financial stability (K_3) is presented in table 1.

Table 1. Value of criteria priority in the selection of alternatives

	K_1	K_2	K_3	W	W_{norm}
K_1	1	5	5	2,92	0,71
K_2	1/5	1	2	0,74	0,18
K_3	1/5	1/2	1	0,46	0,11
Σ	1,40	6,50	8,00	4,12	1,00
λ			3,05		
I_c			0,03		
OC			0,04		

The most important criterion for modern business is profitability, as this criterion has the highest normalised vector (0,71), which is quite logical, since in a competitive environment, businesses are focused on making a profit while ensuring efficient operations. The second most important criterion is data protection (0,18). The least important criterion when choosing an alternative is financial stability (0,11).

The next step is to prioritise the alternatives by each of the criteria. The prioritisation of alternatives by effectiveness is presented in Table 2. The alternative that most effectively provides for the effectiveness of digitalisation of accounting is the use of "Big Data".

Table 2. Priority values of alternatives by the criterion of "profitability"

	A_1	A_2	A_3	A_4	A_5	W	W_{norm}
A_1	1	2	3	4	5	2,61	**0,42**
A_2	1/2	1	2	3	4	1,64	0,26
A_3	1/3	1/2	1	2	3	1,00	0,16
A_4	1/4	1/3	1/2	1	2	0,61	0,10
A_5	1/5	1/4	1/3	1/2	1	0,38	0,06
Σ	2,28	4,08	6,83	10,50	15,00	6,24	1,00
λ				5,07			
I_c				0,02			
OC				0,02			

The priority of the alternatives by the level of data protection is determined by the alternative "DD", as shown in table 3.

Table 3. Priority values of alternatives according to the data protection criterion

	A_1	A_2	A_3	A_4	A_5	W	W_{norm}
A_1	1	1/2	1/3	1/4	1/5	0,38	0,06
A_2	2	1	1/2	1/3	1/4	0,61	0,10
A_3	3	2	1	1/2	1/3	1,00	0,16
A_4	4	3	2	1	1/2	1,64	0,26
A_5	5	4	3	2	1	2,61	0,42
Σ	15,00	10,50	6,83	4,08	2,28	6,24	1,00
λ				5,07			
I_c				0,02			
OC				0,02			

The priority of alternatives according to the criterion of financial sustainability is presented in table 4. For this criterion, the most acceptable alternative is also the use of DD technology.

Table 4. Priority values of alternatives according to the criterion of "financial sustainability"

	A_1	A_2	A_3	A_4	A_5	W	W_{norm}
A_1	1	1/3	1/5	1/7	1/9	0,25	0,03
A_2	3	1	1/3	1/5	1/7	0,49	0,06
A_3	5	3	1	1/3	1/5	1,00	0,13
A_4	7	5	3	1	1/3	2,04	0,26
A_5	9	7	5	3	1	3,94	0,51
Σ	25,00	16,33	9,53	4,68	1,79	7,72	1,00
λ	5,24		I_c	0,06		OC	0,05

The calculations show that, according to the methodology of applying the hierarchy analysis method, it follows that the use of big data and digital twins in the accounting digitalisation system can have the best results for ensuring and improving the competitiveness of modern business.

Accordingly, business leaders should focus on these two areas when choosing the optimal direction of accounting digitalisation. Big data processing can have a positive impact not only on accounting performance, but also on business development opportunities in various areas and sectors. At the same time, the hierarchy analysis method gives grounds to focus on such an innovative approach as the creation of digital twins of companies, which allows modelling the results of certain management decisions and their impact on the effectiveness of control and analytical procedures.

DISCUSSION

In today's world, digitalisation is defined as the transformation of information into a digital format, which in turn helps to increase efficiency, reduce costs of a city enterprise and develop new areas.

Modern scientific periodicals identify certain positive aspects of digitalisation of accounting.

1. Reducing the cost of maintaining the accounting apparatus.[30,31,32] It is worth noting that this indicator does not indicate a reduction in the size of the organisation, but rather an employee's upskilling or retraining for a future profession, for example, from an accountant to a financial engineer. New economic and technological conditions require the creation and implementation of approaches to help citizens master the key competencies of the digital economy, ensure mass digital literacy and personalise education. However, not all authors point to the high cost of implementing digital technologies in accounting, and therefore, the reduction of accounting costs will occur only after the final implementation of innovations.

2. Efficiency of financial and economic activities, which can be ensured by the effectiveness and balanced work with digital innovations.[33,34,35] However, it is worth noting that for most companies, positive changes in accounting will not only improve financial and economic performance, but also increase the performance of related divisions of the company.

3. Speed of data and information processing.[36,37,38,39] We should definitely agree with this positive aspect and emphasise that positive changes in the work of the accounting department will have a positive impact on information processing within the company.

4. Information security, which is ensured by protecting data and creating preconditions for protection against third-party intrusion.[25,40,41,42] It is also worth emphasising that for most companies in the current environment, data protection is becoming the basis for the formation of internal information systems.

CONCLUSION

To sum up, it should be emphasised that today enterprises have significant opportunities for the development

of the accounting system based on the introduction of digital innovations, which can have a rather positive impact on the financial condition of the company and increase its competitiveness in the long run. In the course of the study, the main digital tools and opportunities that open up for modern business, subject to their implementation, were identified. These tools include:

- big data processing;
- blockchain;
- optical information recognition;
- digital twins;
- digital signatures
- electronic document management.

Of course, companies should not introduce all possible digital tools at the same time, but should choose one or two that are most suitable for a particular business, depending on the purpose. To make such a choice, the study applied the hierarchy analysis method, which revealed that modern businesses should focus on the development of the accounting system through the processing of big data and the creation of digital twins in order to increase their competitiveness in the long term.

Although the digitalisation of accounting is a fairly new and quite promising area of modern business development, companies today should also pay attention to data protection and information security, which also requires increased attention from scientists.

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CONFLICT OF INTERESTS

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