

Examination of digital advancements: Their influence on contemporary corporate management methods and approaches



Andrii Krap^a   | Sergii Bataiev^b  | Natalia Bobro^c  | Vladyslav Kozub^d  | Nataliia Hlevatska^e 

^aDepartment Socio-Humanitarian and Fundamental Disciplines, Precarpathian Mykhailo Hrushevsky Institute of the Private Joint Stock Company "Higher Education Institution" The Interregional Academy of Personnel Management, Lviv, Ukraine.

^bThe University of Warwick, Coventry, United Kingdom; ELEKS inc., Lviv, Ukraine.

^cDigital Department, European University, Kyiv, Ukraine; "Noolab & AI" Scientific Laboratory, Zurich, Switzerland.

^dDepartment of Mathematics and Informatics, Luhansk Taras Shevchenko National University, Poltava, Ukraine.

^eDepartment of Economy, Management and Commercial Activity, Faculty of Economics, Central Ukrainian National Technical University, Kropyvnytskyi, Ukraine.

Abstract The academic paper examines the impact of digital innovations on the parameters of the operational, financial, economic and managerial activities of enterprises. Indicators of the formation and development of digital management practice are studied; various criteria are considered, which can be used to determine the presence of digital phenomena in the strategy and their impact on the development of the organization's management system. In light of the developments in the theory and practice of managing social-economic systems, the academic paper outlines the unique features of the management system of contemporary businesses that should be considered. It is emphasized that the era of the digital economy creates prerequisites for improving the efficiency of enterprises. Digital innovations generate new means of social interaction between employees; they transform economic relations between the enterprise and its business partners. More rational and cost-effective methods of cooperation and coordination are emerging to jointly solve particular business problems. However, at the same time, digital innovations also generate negative effects that are informational in nature. The number of models of unfair competition based on the dissemination of deliberately planned disinformation among market participants is growing; the number of economic crimes in cyberspace is increasing dramatically. That is precisely why modern innovative technologies such as blockchain and artificial intelligence provide for open, secure collaboration within the digital information space, and the application of analytics to the data obtained allows for increasing the competitiveness of the business. The rapid development of technology and the emergence of artificial intelligence (AI) have had a significant impact on the formation of digital innovations. The introduction of AI can significantly increase the effectiveness of any company's HR strategies and facilitate the work of its managers by helping to collect and analyze large amounts of data.

Keywords: digital innovation, digital economy, management, blockchain technology, business processes

1. Introduction

A human resources policy is an ongoing guidance of the approach that an entity intends to apply in managing its people. They are specific guidelines for HR managers on various employment-related issues and set out the organization's intentions on various aspects of human resource management, such as recruitment, promotion, reward, training, and selection. Therefore, they are the starting point when developing human resource management methods or when making decisions about the organization's personnel. A good HR policy provides a general guide to the approach taken by the company and, therefore, its employees with respect to various aspects of hiring.

The pandemic has created many opportunities for retraining and upskilling the workforce, such as digital learning platforms. They enable companies to share files and resources, automate workflows, and support employees who are committed to professional development.

The implementation of human resources technologies is one of the most important aspects of the work of human resources leaders to improve talent acquisition, enhance employees' experience, and facilitate effective scaling. Artificial intelligence is one of the most popular areas of HR technology and helps with HR analytics and employee support. Hybrid work remains the leading model for many companies. At the same time, there is a need to develop a platform that will ensure the security of internal data; the blockchain is a solution (Sumets et al., 2022).

Virtual work has a positive impact on employees. According to a McKinsey study, employees who work remotely report greater efficiency and are more optimistic about their work. Thus, human resource technology implements tools that help employees maintain a healthy lifestyle and workplace relationships with the help of DEI&B (Glæssner &



Femerling, 2013). The introduction of new technologies will facilitate the creation of a healthy working environment as well as the training of new employees and the professional development of existing ones. This will allow the organization to establish healthy and long-term working relationships (Popkova, 2019).

In the current business environment, many countries are developing and implementing large-scale government programs aimed at accelerating the advancement of the digital sector and creating favorable conditions for the growth of organizations' competitiveness through the development of IT technologies and the electronics industry.

According to L. Lengrand, the assessment of the real potential of an enterprise has a significant impact on the processes of developing regional and state innovation policy and the selection of priorities for the development of the national innovation system. Thus, the responsibility of participants in innovation activities for the results of the development and implementation of digital technologies is increasing. The results of applying digital innovations at individual enterprises determine the prospects and scale of the use of digital products and technologies in industries, regions, and the national economy.

To assess the evolution of digital activities within businesses, European countries have created an indicator system that defines various domains of public reproduction. The issues of the development and application of these indicators have been studied by many national scholars. V. Semaniuk studied the possibilities and limitations of using artificial intelligence (AI) in management processes. In the course of the research, the scholar encountered a number of problematic issues related to the paradigm gap, which defines AI without taking into account management paradigms. The paradigms that consider artificial intelligence not as a means included in management activities and relevant management paradigms but as an independent object of research are more widespread (Umpleby et al., 2019).

A promising direction for the introduction of digital technologies (Ye, 2017) in economic activity is soil and landscape digital mapping, the introduction of geographic information technologies and the preparation of electronic field maps. Blockchain is another area. It is a multifunctional and multilevel information technology that involves distributed storage and is used to facilitate the accounting of various assets and transactions in a business network. Assets can be both tangible (car, house, money, land, goods) and intangible, such as intellectual property. A blockchain is a decentralized database built in the form of chains of blocks with a specific algorithm and an interconnected set of all blocks. The cryptographic binding of blocks to each other implies the support of particular rules for including new blocks in the registry and tracking attempts to change existing ones. This makes it almost impossible to break the blocks since each transaction in the chain refers to the previous one, and in the case of hacking, the sequence of operations will be blocked.

This technology was originally created in 2008 to support the Bitcoin cryptocurrency with a register distribution system that can be anonymous. Each agreement or transaction is recorded and added to the chain as a new fragment, which is manually assigned a unique multidigit numeric code. This fragment can store data on time, dates, participants, transaction amounts, and information about the entire chain/network (Furman et al., 2023).

In 2017, British Airways conducted a study of the possibility of using blockchain technology in cooperation with the Heathrow, Miami, and Geneva airports. This study demonstrates the effectiveness of using technology in aviation to organize secure information exchange (Schyga et al., 2019). Gartner predicts that blockchain-based businesses will be worth 10 billion USD by 2022. McKinsey estimates the future financial impact of blockchain to be between 80 and 110 billion USD, and the technology will reach full maturity over the next five years. IBM has published a report stating that "15% of banks and 14% of financial institutions intend to implement full-scale commercial blockchain solutions". Blockchain is a revolutionary technology that provides an unprecedented way to control and execute transactions without the need for intermediaries (Gausdal et al., 2018). It can also be applied to make records of these transactions in a publicly available distributed registry with protection against unauthorized access (Stathakopoulous & Cachin, 2017).

Artificial intelligence is a kind of digital computer system capable of analyzing external data, using it for self-learning, and applying the knowledge gained to achieve specific goals and objectives that require the ability to perform human-like intellectual activities (such as visual perception, speech recognition, and decision-making). All of the mentioned examples of companies using artificial intelligence—artificial narrow intelligence—are still at the first stage of development of this technology. This is the first stage of artificial intelligence: the system can only work in one area (for example, face recognition in a photo); it cannot solve issues in other areas, but it is able to show better results than humans in this area. The next stage of development will allow AI to be used in several areas where it will outperform humans or be on par with them in terms of task performance. Finally, the last level of AI development involves conscious systems that apply intelligence in any field, the results of which are superior to those of humans. The last stage of AI development is considered to be genuine artificial intelligence.

The purposes of the research are as follows:

- to analyze the use and justification of technologies that will support digital innovation for organizations.
- to describe the international experience of using artificial intelligence, blockchain and data analytics in creating a strategy for the development of management practices.

2. Materials and Methods

The subject of the research was the Ukrainian and foreign experience of using digital innovations. This involved conducting a retrospective analysis of the use of various technologies and studying the technical specifications, efficiency of use and prospects for the development of blockchain, artificial intelligence and data analytics methods.

Methods of historical and logical analysis and comparison, expert assessments, system analysis and forecasting were used. The research was based on management strategies in modern organizations and the implementation of digital innovative technologies to optimize information.

3. Results

Improving the quality of human resources management is one of the main components of the economic policy of any enterprise. From a strategic perspective, management relies on organizing a human capital foundation to ensure that production activities meet customers' expectations. The digital innovation of human resources management is one of the most important ways to solve this problem. Theoretical and practical comprehension of the impact of digital technologies on the socioeconomic system of modern industrial enterprises and organizations has allowed the formation of a number of characteristic features inherent in business organizations in the digital economy.

The features of the functioning of industrial enterprises and organizations in the digital economy are as follows:

- businesses are investing more in research and development related to digital technologies and innovative cyber-physical processes;
- The quality of enterprise telecommunication networks is improving due to the introduction of 4G technologies and fiber optic data transmission;
- The possibilities of using mobile devices to access the internet space for the purpose of arranging communications and making management decisions are increasing significantly;
- the availability of information about a resource and its potential for use in regulating and planning activities is more important to organizational management than acquiring a resource itself;
- development and implementation of innovative projects based on the principles of robotics, 3D printing, etc.;
- using big data to optimize management decisions and select the most appropriate management alternatives;
- application of software products for setting up production processes for manufacturing complex products;
- ideas and solutions move faster between companies from different industries and territories.

The period for updating industrial equipment has significantly accelerated. The renewal rate of fixed assets is the highest in the digital sector of the economy. The full replacement of technological equipment and software is conducted once a year. Awareness of modern computing hardware and software and the ability to apply them in practice are becoming mandatory competencies of qualified specialists. Digital technologies have a long-term synergistic effect; consequently, the development of an organization's digital potential is an important factor in retaining and increasing its competitiveness (Khatniuk et al., 2023).

With respect to business growth, 66% of global business leaders and analysts agree that artificial intelligence will drive most innovations in almost all industries over the next 1-5 years (Table 1). For instance, Mark Hornung, a Senior Employer Brand Strategy Specialist at Exaqueo, believes that AI and ML will help HR managers reduce their workload while further improving the overall productivity of their business in 2023.

Table 1 Rating of the world's largest companies, 2023.

Companies	Specialization	Capitalization, \$
Apple	Electronics production, development and production of information technologies	3022 billion
Microsoft (MSFT)	Software development and production	2534 billion
Saudi Aramco	Oil and gas extraction	2087 billion
Google	YouTube video hosting, internet services, programs	1554 billion
Amazon	Electronic commerce	1337 billion
NVIDIA (NVDA)	Supercomputers for scientific computing, cryptocurrency mining, game streaming, portable gaming devices	1057 billion
Tesla (TSLA)	Automaker	885 billion
Meta Platforms (META)	Social network, software	759 billion
Berkshire Hathaway	Holding company	743 billion
TSMC (TSM)		

Source: Smith (2022)

A study conducted by Morgan Philips Group showed that blockchain will change some trends in HR technology in 2023. For instance, blockchain offers robust security capabilities such as network encryption, where employees and companies can securely exchange information, allowing recruiters to verify employees' data, including educational and career achievements (Table 2). Digital technologies and knowledge are penetrating various spheres of social life, becoming a key factor in the development of scientific and technological progress and the growth of social welfare. The digital goods and services sector is developing at an increasingly rapid pace every year, outpacing the growth of traditional businesses (Romanova, 2012).

Table 2 Stages of improving HR management by means of artificial intelligence.

Stages	Means of artificial intelligence	
1. Preparatory stage	1.1. Analysis of HR management functions	1.1.1. Identification of problems in work with personnel 1.1.2. Setting goals and objectives for improvement of work with personnel
	1.2. Identification of the need to apply artificial intelligence in human resources management (and calculation of economic efficiency)	
	1.3. Assessment of management's attitude to the introduction of artificial intelligence technologies	
	1.4. Assessment of employees' attitudes toward artificial intelligence technologies	
2. Projecting the implementation of artificial intelligence	2.1. Expert evaluation, selection of artificial intelligence technology	
	2.2. Development of measures to minimize the risks of technology implementation	
3. Implementation of artificial intelligence	3.1. Integration of artificial intelligence in a modern artificial intelligence system	
	3.2. Analysis of risks	
4. Assessment of artificial intelligence implementation	4.1. Control of the indicator of goal achievement	
	4.2. Assessment of the effectiveness of artificial intelligence technologies	
	4.3. Assessment of risks and their minimization	
5. Development of the strategy for implementing artificial intelligence	5.1. Accounting for all identified risks when developing strategies for implementing artificial intelligence in human resources management	

Source: Smith (2022)

Currently, digitalization is a strategic vector of development and an important direction for the modernization of certain sectors of the economy and social sphere of Ukraine. Thus, according to statistics, an increasing number of organizations are using digital and information technologies such as electronic data exchange, big data analysis, and local area networks. At the same time, there is a decrease in the use of digital platforms, geographic information systems and servers by organizations in 2022 compared to 2021 due to the Russian invasion (Figure 1).

The most frequently used new information technologies in the global practice of managing businesses are Big Data, blockchain, artificial intelligence, and the Internet of Things. Many researchers suggest that blockchain technology may become one of the main sources of transformation of existing business models of an organization. Traditional major players in the financial industry are implementing the following blockchain projects: Nasdaq has launched Nasdaq Linq, a blockchain-based private company stock platform, and forty-two of the world's largest financial institutions, including Goldman Sachs, JPMorgan Chase and Credit Suisse, have formed the R3 consortium to explore blockchain's potential for faster and more secure transactions (Ream et al., 2016). For instance, the most advanced cloud-based AI platforms, such as Microsoft's Genee, Oracle's Crosswise, or Salesforce's Einstein aim, use predictive analytics and data analytics to gain a competitive advantage in their respective markets (Kumar et al., 2020; Kussainov et al., 2023).

Artificial intelligence is one of the key drivers for all sectors of the economy. Artificial intelligence does not just allow for the digitalization of many processes, making them more efficient, increasing productivity and complementing human capabilities. Its application and dissemination can radically change many things—from the labor market to entire industries. The ways to integrate artificial intelligence technologies to improve staff performance are reflected in Table 2. With the advent of artificial intelligence, companies are increasingly raising issues about the capabilities of these technologies and

their potential application in various areas of the company's activities and at different stages of product value creation and human resources management. For instance, customer data management can be greatly simplified with the introduction of AI: the speed and quality of data collection, processing, and analysis will increase.

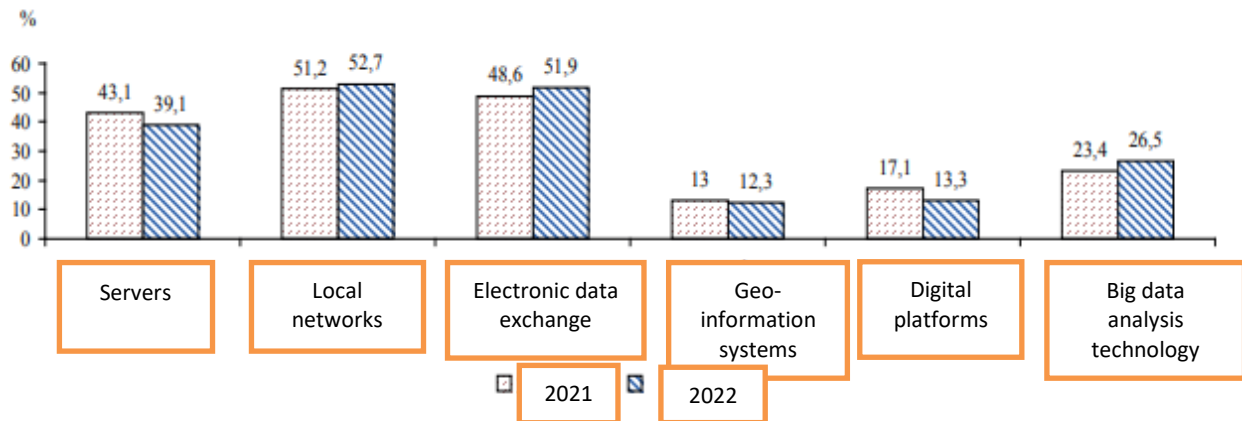


Figure 1 Ukrainian organizations using digital and information technologies (as a percentage of the total number of surveyed organizations).

Source: Karpluk (2019)

The analyzed studies showed that companies rarely use artificial intelligence technologies in human resource management. We hope that the developed logical scheme for the implementation of artificial intelligence in human resource management will make it possible to structure tasks and use the capabilities of artificial intelligence technologies as a technological flagship in human resource management.

4. Discussion

As part of the research, an in-depth study of the technology will be conducted on blockchain, smart contract developments that are highly important for facilitating the process of identification, and seamless integration of smart contracts into web applications. In addition, studies will include an evaluation of the safety and performance of the system being developed, as well as an assessment of its effectiveness and applicability (Allam, 2018). Currently, various industries are developing programs based on digital innovations, such as financial and industrial services, supply chain services, legal and healthcare services, IoT and blockchain integration, and big data analytics. Blockchain technology has the potential to change the rules of the game in storing and transmitting transaction data since it eliminates the need for intermediary organizations. This will help to significantly simplify the chain of control and management of the organization's personnel (Pan et al., 2020; Mironova et al., 2022).

The result of this work is a digital identification system, which offers an alternative to traditional methods. The goal is to improve data security, reduce fraud risks and give users more control over personal information (Onik et al., 2018). Technology implies that users do not need to trust each other in the traditional sense because trust is embedded in the system itself. This means that users' personal information is confidential and protected, and all actions are transparent and incorruptible – they are agreed upon through mass cooperation and stored in the digital ledger code (Sunny et al., 2020). Financial companies, audit companies, and banks are already working on private blockchain initiatives since the new world may make their services irrelevant. Research on blockchain-based digital identity verification is a promising way to overcome these limitations. Using blockchain with decentralized, secure and user-centric characteristics, we aim to fundamentally change the way personal identity is verified on the internet, providing greater trust and security in the digital realm.

5. Conclusions

The implementation of the proposed digital innovative technologies in the management of modern organizations will achieve the following results:

- assist in identifying factors for increasing the level of profitability in the context of digitalization to ensure the sustainable development of modern organizations;
- conducting a comprehensive assessment of increasing the profitability of organizations, taking into account the use of innovative methods of digital economy development;
- expanding the scope of innovative methods for assessing the financial condition of enterprises;

- substantiation of strategic approaches (using artificial intelligence or blockchain) to the formation of a mechanism for resource provision, cash flows in the turnover system of organizations, taking into account the strategies of modern organizations.
- Blockchain technology uses cryptography to securely exchange anything of value, from money and stocks to data, artwork, voices, and much more.

Ethical considerations

Not applicable.

Conflict of interest

The authors declare no conflicts of interest.

Funding

This research did not receive any financial support.

References

- Alharby, M., & Van Moorsel, A. (2017). *Blockchain-based Smart Contracts: A Systematic Mapping Study*. arXiv preprint arXiv:1710.0637
- Allam, Z. (2018). On smart contracts and organisational performance: A review of smart contracts through the blockchain technology. *Review of Economic and Business Studies*, 11(2), 137–156.
- Furman, D., Shchokin, R., Kubitskiy, S., (...), Strochenko, N., Dorosh, I. (2023). Motivation and incentives for employees of domestic enterprises. *Journal of Law and Sustainable Development*, 11(3), art. no. e0815.
- Gausdal, A.H., Czachorowski, K.V. and Solesvik, M.Z. (2018). Applying Blockchain technology: evidence from Norwegian companies. *Sustainability*, 10, 1985. <https://doi.org/10.3390/su10061985>
- Gleissner, H. and Femerling, J. C. (2013). *Logistics, Springer Texts in Business and Economics, Springer International Publishing Switzerland*. https://doi.org/10.1007/978-3-319-01769-3_2
- Khatniuk, N., Shestakovska, T., Rovnyi, V., Pobiianska, N., Surzhyk, Y. (2023). Legal principles and features of artificial intelligence use in the provision of legal services. *Journal of Law and Sustainable Development*, 11(5).
- Korolyuk T.M. (2021) Digital transformation of information processes: experience of domestic enterprises. Ukraine, Lutsk, February 18, 2021, 338–340.
- Kumar, V., Ramachandran, D. and Kumar, B. (2020). Influence of new-age technologies on marketing: A research agenda. *Journal of Business Research*.
- Kussainov, K., Goncharuk, N., Prokopenko, L., Pershko, L., Vyshnivska, B., & Akimov, O. (2023). Anti-corruption management mechanisms and the construction of a security landscape in the financial sector of the EU economic system against the background of challenges to european integration: Implications for artificial intelligence technologies. *Economic Affairs (New Delhi)*, 68(1), 509-521. <https://doi.org/10.46852/0424-2513.1.2023.20>
- Lengrand L. (2006). *Smart innovation: A practical Guide to Evaluating Innovation Programmes*. Brussels-Luxemburg: University of Manchester, 199 p.
- Mironova, N., Koptieva, H., Liganenko, I., Sakun, A., & Chernyak, D. (2022). Modeling the selection of innovative strategy for development of industrial enterprises. *WSEAS Transactions on Business and Economics*, 19, 278-291. <https://doi.org/10.37394/23207.2022.19.26>
- Onik, M. H., Miraz, M. H., & Kim, C. S. (2018). *A recruitment and human resource management technique using blockchain technology for industry*, 4.0.
- Pan, X., Pan, X., Song, M., Ai, B., & Ming, Y. (2020). Blockchain technology and enterprise operational capabilities: An empirical test. *International Journal of Information Management*, 52.
- Panasjuk V., Burdeniuk T., Muzhevych N. (2021). Features of digital accounting transformation. *Galician economic journal*, 1(68), 70–76.
- Popkova, E.G. (2019). Preconditions of formation and development of industry 4.0 in the conditions of knowledge economy. *Studies in Systems, Decision and Control*, 169, c. 65-72.
- Ream, J., Chu, Y. and Schatsky, D. (2016). Upgrading Blockchains: smart contract use cases in industry. *Deloitte University Press*, 02(04), 1–11.
- Romanova, O.A. (2012). Neoindustrialization as a factor in improving economic security of old-industrial regions. *Economy of Region*, (2), 70-80.
- Schyga, J., Hinckeldeyn, J., Bruss, B., Bamberger, C., Kreutzfeldt, J. (2021). Application-driven test and evaluation framework for indoor localization systems in warehouses. *In Proceedings of the WiP 2021 International Conference on Indoor Positioning and Indoor Navigation (IPIN)*, 1–16.
- Semaniuk, V., Shpak, V., & Papinko, A. (2021). Estimation of the information efficiency of the accounting system. Paper presented at the 2021 11th International Conference on Advanced Computer Information Technologies, ACIT 2021 – Proceedings, 437–440. <https://doi.org/10.1109/ACIT52158.2021.9548557>
- Semanyuk, V. Z. (2018). *Information theory of accounting in postindustrial society*: monogr. Ternopil: TNEU. 392 p.
- Si, H., Sun, C., Li, Y., Qiao, H., & Shi, L. (2019). IoT information sharing security mechanism based on blockchain technology. *Future Generation Computer Systems*, 101, 1028–1040.
- Spivak S., Gunderuk T., Hohus S., Chychun S. (2021) Digitalization of accounting processes at small and medium-sized business enterprises. *Socio-Economic Problems and the State* (electronic journal), 25(2), 385–392. <https://doi.org/10.33108/sep2022.02.385>
- Stathakopoulous, C., Cachin, C. (2017). Threshold signatures for Blockchain systems. *IBM Research*. Zurich: Swiss Federal Institute of Technology, 42.
- Sumets, A., Kniaz, S., Heorhiadi, N., Skrynkovskyy, R., & Matsuk, V. (2022). Methodological toolkit for assessing the level of stability of agricultural enterprises. *Agricultural and Resource Economics*, 8(1), 235-255. <https://doi.org/10.51599/are.2022.08.01.12>
- Sunny, J., Undralla, N., & Pillai, V. M. (2020). Supply chain transparency through blockchain-based traceability: An overview with demonstration. *Computers & Industrial Engineering*, 150, Article 106895.

- Tien, J.M. (2015). Internet of connected ServGoods: considerations, consequences and concerns. *Journal of Systems Science and Systems Engineering*, 24, 130–167. <https://doi.org/10.1007/s11518-015-5273-1>
- Umpleby S.A., Medvedeva T.A., & Lepskiy V. (2019) Recent Developments in Cybernetics, from Cognition to Social Systems. *Cybernetics and Systems*. 50(4), 367–382.
- Wang, Z., Wang, T., Hu, H., Gong, J., Ren, X., & Xiao, Q. (2020). Blockchain-based framework for improving supply chain traceability and information sharing in precast construction. *Automation in Construction*, 111. <https://doi.org/10.1016/j.autcon.2019.103063>
- Xu, L., Chen, L., Gao, Z., Chang, Y., Iakovou, E. and Shi, W. (2018). Binding the physical and cyber worlds: a Blockchain approach for cargo supply chain security enhancement. *IEEE International Symposium on Technologies for Homeland Security (HST)*, Woburn, 1–5. <https://doi.org/10.1109/THS.2018.8574184>
- Ye, S. (2017). Research on the enterprise accounting statement evaluation and financial management optimization based on computer artificial intelligence method. *Boletin Tecnico/Technical Bulletin*, 55(20), 208-215.