УДК 005.21:004.8
DOI: https://doi.org/10.30838/EP.199.134-138

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USE OF DIGITAL TECHNOLOGIES FOR MAKING EMERGENCY MANAGEMENT DECISIONS IN CONDITIONS OF UNCERTAINTY

The development of digital technologies complicates decision-making in management. Traditional management methods often lack efficiency, necessitating digital tools to accelerate decision-making.

This study analyzes the role of digital technologies in emergency decision-making under uncertainty. Using system analysis and modeling, it evaluates automated analytical systems, machine learning, blockchain, and digital platforms.

Findings show that digital solutions improve decision speed. Automated systems enable rapid data processing, machine learning aids forecasting, and blockchain enhances security. Hybrid models combining traditional and digital approaches prove effective in uncertainty.

The study's practical value lies in integrating these technologies into IT sector management, improving decision quality, response time, and cybersecurity.

Keywords: *management decisions, digital technologies, artificial intelligence, machine learning, blockchain, automated analytical systems, crisis management, uncertainty, decision support, digital transformation.*

JEL classification: *M15, D81.*

ВИКОРИСТАННЯ ЦИФРОВИХ ТЕХНОЛОГІЙ ДЛЯ УХВАЛЕННЯ ЕКСТРЕНИХ УПРАВЛІНСЬКИХ РІШЕНЬ В УМОВАХ НЕВИЗНАЧЕНОСТІ

Розвиток цифрових технологій змінює управлінські процеси, ускладнюючи прийняття рішень. В ІТ-секторі організації часто стикаються з необхідністю негайного реагування, проте традиційні методи управління, що базуються на поступовому аналізі подій та експертних оцінках, не завжди забезпечують належну ефективність, що вимагає впровадження сучасних цифрових інструментів, які сприяють пришвидшенню ухвалення управлінських рішень та підвищенню їхньої обґрунтованості.

Метою дослідження є аналіз використання цифрових технологій для ухвалення екстрених управлінських рішень в умовах невизначеності в ІТ-секторі. У роботі застосовано методи системного аналізу, порівняльної оцінки та моделювання, що дозволяють описати можливості цифрових технологій у сфері управління. Аналізується застосування автоматизованих аналітичних систем, алгоритмів машинного навчання, блокчейн-рішень та цифрових платформ для підтримки управлінських рішень.

Результати дослідження демонструють, що цифрові технології здатні суттєво підвищити швидкість ухвалення управлінських рішень. Автоматизовані аналітичні системи забезпечують оперативний збір, обробку та інтерпретацію даних, що сприяє швидшому реагуванню на зміну ситуації. Машинне навчання дозволяє прогнозувати можливі сценарії розвитку подій, що особливо важливо для зниження невизначеності та ризиків. Використання блокчейн-технологій підвищує рівень довіри та прозорості у процесі ухвалення рішень, що може бути важливим для захисту даних. Гібридні моделі управління, що поєднують традиційні та цифрові підходи, демонструють високу ефективність в умовах невизначеності, оскільки дозволяють використовувати доступні ресурси для оперативного аналізу ситуації.

Практична цінність дослідження полягає у можливості впровадження запропонованих підходів в управлінські процеси організацій ІТ-сектору. Використання цифрових технологій у процесах управління може значно покращити якість ухвалених рішень, скоротити час їх прийняття та підвищити рівень захищеності інформації. Одержані результати можуть бути застосовані у розробці методичних рекомендацій для менеджерів ІТ-сектору, а також у подальших дослідженнях щодо впливу цифровізації на процеси управління.

Ключові слова: *управлінські рішення, цифрові технології, штучний інтелект, машинне навчання, блокчейн, автоматизовані аналітичні системи, управління, невизначеність, підтримка ухвалення рішень, цифрова трансформація.*

Problem statement. The development of digital technologies is significantly changing approaches to management decision-making, especially in the face of uncertainty. Traditional management methods based on careful analysis and long-term planning are often not effective enough to resolve crisis situations that arise in the IT sector. In today's environment, where information may be incomplete or contradictory, there is a need to develop urgent decision-making mechanisms to minimize risks.

Digital technologies, such as artificial intelligence, automated data analysis systems, and blockchain, significantly enhance the capabilities of managers by speeding up information processing and improving forecasting accuracy. However, the question of their effective use remains open, especially in the context of the need to make decisions in a short period of time. In the IT sector, where business entities face technological failures, cyber threats, and sudden market changes, it is important to have effective tools for prompt analysis of the situation and quick decision-making.

The need to conduct this study is explained by the growing instability of the external environment and the need to develop management mechanisms that will allow for an effective response to crisis changes. The use of traditional approaches based on linear decision-making models does not always correspond to modern conditions, as delays in decision-making can lead to financial losses and loss of competitive advantage.

The scientific significance of the study lies in the development of models and tools for urgent management decision-making using digital technologies. The practical value lies in the possibility of their application in the IT industry to improve the efficiency of crisis management and minimize risks. The study will result in recommendations for the integration of modern digital platforms and artificial intelligence algorithms into the management system, which will increase the speed and validity of decision-making.

Analysis of recent research and publications. A significant amount of modern research is devoted to the issues of management decisions in the context of digitalization and uncertainty. Recent scholarly works pay considerable attention to digital tools used to make management decisions. Modern technologies make it possible to quickly process information, analyze large amounts of data, and automate processes that previously required significant resources. However, the question of the effectiveness of such approaches in situations where decisions need to be made in a short period of time remains open. Despite the rapid development of digital platforms, there is still a need to determine their real impact on operational management, in particular in non-standard and crisis conditions. It is also important that most studies focus on long-term transformations, leaving aside the urgent decisions that need to be made in the face of sudden changes. For example, Melnyk A.O. [2] analyzes the implementation of digital solutions to improve management. The author describes task automation, Big Data analytics, electronic document management, and communication platforms that help organizations better respond to change. However, this work does not address the issue of making urgent decisions in the IT field, which is important in our study.

The article by Zangana H.M., Mohammed H.S., Husain M.M. [6] discusses the transition from traditional systems to modern digital solutions. The authors emphasize the importance of Agile, Scrum, and Kanban approaches to improve management, but do not pay attention to the analysis of urgent decisions in crisis situations.

In their study, Sahoo S.K. and Goswami S.S. [3] provide an overview of multi-criteria decision-making (MCDM) methods. The authors consider traditional approaches, such as the Analytic Hierarchical Process (AHP), the Theory of Optimal Solution Similarity (TOPSIS), and ELECTRE, as well as the latest models that include data mining, fuzzy logic, and hybrid methods. Considerable attention is paid to the integration of MCDM with modern technologies, such as artificial intelligence, blockchain, and the Internet of Things, which expands the possibilities of automating the decision-making process. However, the paper does not investigate the impact of these methods on urgent management decision-making in crisis situations, which is important for our study.

The work of Ana Nurfadilah and Ilham [1] deals with the problems of integrating information management systems (MIS) into decision-making processes. The authors identify obstacles such as high costs, problems with combining old and new systems, and cybersecurity issues. However, the paper does not analyze how these systems can support decision-making in critical situations.

Levina-Kostiuk M.O., Melnychuk O.I. and Telichko, N.O. [9] study methods of making managerial decisions in conditions of insufficient information. The authors consider approaches based on game theory, statistical solutions, expert opinions, and heuristic methods. They emphasize that the use of an integrated approach makes it possible to increase the probability of making an effective decision. However, the paper does not consider the use of digital technologies and automated systems in the process of making urgent decisions.

The study contains an analysis of approaches to decision-making, but does not focus on emergency decisions that may arise in the context of digital instability.

Augustine R., Budniak L., and Budniak V. [7] analyze the efficiency of business processes in the IT sector in the context of digital transformation. The authors consider how business analysis methods contribute to improving management decision-making, identifying risks, and assessing the needs of companies. However, the article lacks an analysis of urgent decision-making and mechanisms for rapid response to crisis situations in the IT sector.

The analysis of scientific literature shows a growing interest in digital technologies in management decision-making. However, despite numerous studies, the issue of rapid decision-making in crisis situations, especially in the IT sector, has not been sufficiently addressed. Most scientific papers focus on long-term transformations, without paying sufficient attention to rapid response to unforeseen events. The use of automated systems, artificial intelligence, and big data analytics are promising areas for improving management efficiency under uncertainty, but their impact on

urgent decisions in an unstable environment remains poorly understood. This justifies the need to further study the mechanisms of emergency management decision-making using digital technologies, which is the subject of our study.

Purpose of the article – to study the use of digital technologies for emergency management decision-making in the face of uncertainty in the IT sector. The study is aimed at identifying factors that affect the speed and accuracy of decision-making, analyzing the possibilities of using automated analytical systems, and developing recommendations for integrating artificial intelligence and digital platforms into the crisis management process.

Summary of the main results of the study. Management decisions in the context of digitalization and uncertainty are a complex process that requires a rapid response to changes in the internal and external environment [5]. In the IT sector, the problem of making urgent decisions is particularly acute due to the constant growth of risks associated with technological failures, cyberattacks, and changes in the legislative regulation of the digital space. Traditional management approaches based on expert opinions and gradual analysis of the situation do not always provide the necessary speed and accuracy in decision-making.

The scientific literature identifies several main methods of decision-making in an unstable environment. They include:

- multi-criteria decision-making (MCDM) methods, which are used to evaluate alternatives and select the optimal solution based on several criteria that are important for the organization;
- artificial intelligence (AI) and machine learning methods that allow analyzing large amounts of data, predicting possible scenarios and reducing uncertainty in decision-making processes;
- automated analytical systems, which include the use of business intelligence, Big Data tools, and blockchain technologies to monitor market changes and model possible risks.

Table 1 provides a comparative description of approaches to decision-making in crisis situations, which allows us to assess their effectiveness depending on the speed, accuracy and complexity of implementation.

Table 1

Comparative Characterization of Approaches to Management Decision Making

Decision-making method	*Decision-making speed*	*Forecast accuracy*	*Implementation complexity*
Traditional analysis (expert opinions)	Low	Medium	Low
Multi-criteria decision-making models (MCDM)	Medium	High	Medium
Machine learning (neural networks)	High	High	High
Automated analytical systems	High	High	Medium
Blockchain tools	Medium	High	High

Source: created by the author

As Table 1 shows, the most effective methods are those based on machine learning and automated analytics systems. They allow you to quickly process large amounts of information and offer optimal solutions. However, their implementation requires significant resources and technical expertise.

The use of digital technologies in management helps to improve the quality of decision-making, reduce the time spent on information analysis, and increase forecasting accuracy. Research [3] confirms that machine learning algorithms can effectively analyze large amounts of data and find optimal solutions even under conditions of uncertainty. In addition, [1] notes that the use of automated decision support systems (DSS) can significantly reduce the time for analyzing alternatives.

Scientific sources indicate that digital technologies are most actively implemented in those areas where the speed of decision-making is a determining factor. For example, risk analysis algorithms based on artificial intelligence are widely used in the financial sector. In the IT sector, automated analytical systems are used to monitor data security, and in large technology companies, to optimize business processes and allocate resources.

Table 2 summarizes the results of the analysis of scientific papers on the impact of digital technologies on the speed and accuracy of management decision-making.

Table 2

The impact of digital technologies on the speed of decision-making

Technology	*Impact on decision-making speed**	*Impact on forecasting accuracy**
Machine learning	+50 %	+ 40%
Automated analytical systems	+45 %	+ 35%
Blockchain solutions	+30 %	+ 25%
Traditional methods	0 %	0 %

Source: data are based on the generalization of results from scientific publications [1-3, 11]

Studies show that the use of digital technologies can significantly improve the management decision-making process [4]. At the same time, the greatest effect is achieved through the use of machine learning and automated analytical systems that allow to quickly assess the situation and offer optimal solutions.

Thus, modern digital technologies significantly change management decision-making processes, especially in conditions of uncertainty. As noted in studies [3], the use of automated analytical systems and machine learning methods can improve the accuracy of decisions, minimize the human factor, and speed up the response to crisis situations.

The development of digital governance contributes to the implementation of three main approaches to improving the efficiency of decision-making:

- intelligent data analysis systems (Ai-Driven Decision Making) - the use of artificial intelligence to process large amounts of data, analyze risks and predict the consequences of decisions;
- automated decision support systems (DSS) - integration of digital platforms for collecting information, evaluating alternatives and choosing the best solution;
- hybrid management models - a combination of traditional decision-making methods and digital technologies to improve the accuracy and speed of management in complex situations.

An important aspect of the introduction of digital technologies is their practical application in various sectors of the economy. According to the analysis of scientific research [2], the greatest effect of digitalization of management is achieved in areas operating in conditions of high competition, rapid technological change and significant uncertainty.

Table 3 shows the prevalence of digital technologies in various industries.

Table 3

Use of digital technologies in management processes

Industry	***Intelligent analytical systems***	***DSS***	***Hybrid models***
IT sector	High	High	Medium
Financial technologies	High	High	High
Logistics and transportation	Medium	High	Medium
Manufacturing	Low	Medium	High
Healthcare	High	Medium	Low a

Source: data are based on the generalization of results from scientific publications [1-3, 10, 11]

As Table 3 shows, digital tools are most widely used in the financial and information technology sectors, while manufacturing industries are focusing on hybrid management models.

Despite the advantages of digital technologies in decision-making, their implementation is accompanied by certain difficulties. According to [1], the main barriers to digitalization are

- difficulty of integration with traditional systems, as most organizations have outdated management approaches that are difficult to combine with new digital solutions;
- shortage of specialized personnel, as the use of machine learning and automated analytical systems requires appropriate skills that managers often lack;
- cybersecurity threats, as the automation of management processes is associated with the risks of data leakage and information misuse;
- high cost of implementation, as the deployment of digital platforms requires significant financial investments that may be unaffordable for small and medium-sized organizations.

Overcoming these challenges requires the development of comprehensive digital transformation strategies, including staff training, the use of cloud solutions to reduce costs, and enhanced data security measures.

Conclusions. The study showed that digital technologies play a significant role in management decision-making, especially in times of uncertainty. Machine learning methods, automated analytical systems, and DSS platforms are the most effective in speeding up the data analysis process and minimizing risks.

However, despite the positive impact of digital solutions, there are certain limitations to their use, including the complexity of integration, lack of qualified specialists, and data security issues. Therefore, further research should focus on developing management models that take these factors into account, as well as on assessing the effectiveness of digital technologies in crisis management processes.

The results obtained may be useful for managers of organizations seeking to introduce modern technologies into the management system, as well as for researchers studying digital tools in decision-making.

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