The influence of artificial intelligence on managerial decision-making in conditions of uncertainty and rapid changes

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Annotation. The article is devoted to the issues of the influence of artificial intelligence in management decisions. Artificial intelligence allows you to automate many routine management tasks, freeing up time for strategic planning and creative decisions. This is especially important in an environment of rapid change, where speed of response to market challenges is key. Studying the impact of artificial intelligence on management decisions is important because it helps to understand how companies can operate more effectively in the face of uncertainty and rapid change, increasing their efficiency and competitiveness. The purpose of this article is to analyse the role of artificial intelligence in management and its impact on decision-making in languages of uncertainty. The research is based on the use of a number of general theoretical methods, principles and approaches. To achieve the goal and solve the research tasks, the following methods were used: theoretical, in particular generalisation of theoretical data, comparison, synthesis - to determine the role of artificial intelligence in management and its impact on decision-making in languages of uncertainty. It is important to note that changes in the modern business environment are caused by the high dynamism and instability of the external environment. This is due to the current challenges in the country, which intensify competition and encourage companies to use new technologies and business process management tools in order to find the optimal vector of strategic development. It was determined that artificial intelligence is becoming an indispensable tool for making management decisions in the face of uncertainty and rapid change. It allows companies to better understand the market, quickly adapt to new conditions and increase the efficiency of their processes. However, the successful implementation of AI requires consideration of ethical aspects, data quality, and staff training. It is noted that the implementation of AI in management processes under conditions of uncertainty and rapid change can significantly improve the quality of decision-making and increase the competitiveness of the organisation. For successful implementation, it is important to clearly define goals, ensure quality data, select appropriate tools, and train staff. Proper planning, choice of tools, effective data management and, most importantly, staff training are key factors

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in the successful use of AI in business. It is important not only to invest in the technology, but also in the people who will work with it, providing the right training and support to achieve the maximum result.

Keywords: management solutions, artificial intelligence, business processes, efficiency, forecasting.

Вплив штучного інтелекту на прийняття управлінських рішень в умовах невизначеності та швидких змін

Анотація. Стаття присвячена питанням впливу штучного інтелекту на прийняття управлінських рішень. Штучний інтелект дозволяє автоматизувати багато рутинних управлінських завдань, звільняючи час для стратегічного планування та творчих проєктів. Це особливо важливо в умовах постійних змін, коли швидкість реакції на ринкові виклики є ключовою. Вивчення впливу штучного інтелекту на прийняття управлінських рішень є важливим, оскільки це допомагає зрозуміти, як компанії можуть ефективніше діяти в умовах невизначеності та швидких змін, підвищуючи свою продуктивність і конкурентоспроможність. Метою цієї статті є аналіз ролі штучного інтелекту в управлінні та його вплив на прийняття рішень в мовах невизначеності. Дослідження базується на використанні низки загальнотеоретичних методів, принципів і підходів, зокрема узагальнення теоретичних даних, порівняння, синтез. Важливо зазначити, що зміни в сучасному бізнес-ландшафті зумовлені високою динамічністю та нестабільністю зовнішнього середовища. Це пов'язано з поточними викликами в країні, які загострюють конкуренцію та спонукають компанії застосовувати нові технології й інструменти управління бізнес-процесами з метою пошуку оптимального вектора стратегічного розвитку. Визначено, що штучний інтелект стає незамінним інструментом для прийняття управлінських рішень в умовах невизначеності та швидких змін. Він дозволяє компаніям краще розуміти ринок, швидко адаптуватися до нових умов та підвищувати ефективність своїх процесів. Однак для успішного впровадження ШІ необхідно враховувати етичні аспекти, якість даних і підготовку персоналу. Зазначено, що впровадження ШІ в управлінські процеси в умовах невизначеності й швидких змін може значно покращити якість прийняття рішень та підвищити конкурентоспроможність організації. Для успішного впровадження важливо чітко визначити цілі, забезпечити якісні дані, обрати відповідні інструменти та підготувати персонал. Правильне планування, вибір інструментів, ефективне управління даними та, що найважливіше, підготовка персоналу є ключовими факторами успішного використання ШІ в бізнесі. Важливо інвестувати не лише в технології, але й у людей, які будуть з ними працювати, забезпечуючи належну підготовку та підтримку для досягнення максимального результату.

Ключові слова: управлінські рішення, штучний інтелект, бізнес-процеси, ефективність, прогнозування.

Introduction

Business development in the face of modern challenges requires strategic alternatives in management systems. This is due to the fact that in the context of high rates of scientific and technological progress, it is important to synchronise business processes with the latest achievements, including artificial intelligence. In the context of digital technologies, strategic business development should focus on the development and implementation of innovations through the use of artificial intelligence in business process management to unlock the potential of business units.

Today's business landscape is rapidly changing under the influence of globalisation, technological progress and unpredictable events such as economic crises or pandemics. In such an environment, the ability to make effective management decisions is rapidly becoming crucial to the competitiveness of companies. Artificial intelligence (AI), with its ability to process large amounts of data and make predictions, allows for more informed and timely decisions. The amount of information that needs to be processed to make optimal decisions is constantly growing. Traditional analysis methods cannot always handle such data effectively. It is able to analyse complex data, identify patterns and trends, which helps managers make decisions based on evidence rather than intuition. AI can automate many routine management tasks, freeing up time for strategic planning and creative solutions. This is especially important in a rapidly changing environment, when the speed of response to market challenges is key. Modern managers must adapt to the new environment where AI is becoming an integral part of business processes. This requires new skills, such as understanding the capabilities of AI and the ability to integrate it into management decisions.

Therefore, studying the impact of AI on management decisions is important as it helps to understand how companies can act more effectively in the face of uncertainty and rapid change, increasing their efficiency and competitiveness.

Many domestic scientists have studied the application of artificial intelligence in management processes. In particular, these issues have been addressed by N. Hrynchak and O. Horobets [1], O. Hudz, M. Gadytskyi, I. Cherniavskyi [2], I. Kryvyaziuk [3] and others. A. Shevchuk [4], I. Skliaruk, N. Vovk [5] and others paid attention to theoretical issues of improving management processes.

Ukrainian scientists N. Basyurkina and A. Lyzogub [6] define the basis for integrating AI into decision-making models, providing objective data and forecasts for innovative solutions under conditions of uncertainty.

L. Verbivska [7] describes how AI can help to adapt to market changes and competition, which can be especially useful in conditions of uncertainty.

A team of authors led by D. Arzyantseva is studying the impact of artificial intelligence on the effectiveness of management decisions and possible options for involving a manager in decision-making with the participation of artificial intelligence [8].

L. Goniukova, M. Surzhyk [9] provide an idea of how AI can be integrated into public administration systems to improve decision-making under uncertainty.

I. Perevozova et al. [10] believe that the impact of AI may include aspects of using AI to forecast and control costs under conditions of uncertainty.

The research of L. Shymanovska-Dianich and O. Lozova can provide insight into the role of AI in the process of digital maturity and transformation of business processes in the context of economic changes in Ukraine [11].

T. Hrynko et al. review general trends in business activity, including the impact of new technologies such as AI on management decisions [12].

C. Ahmed analyses how AI can influence management decisions, including benefits, risks, and potential problems [13].

Accordingly, the *purpose of this article* is to analyse the role of artificial intelligence in management and its impact on decision-making in uncertainty languages.

Objectives of the article:

1. Identify the role of artificial intelligence in management processes.
2. To explore the possibilities of using artificial intelligence in conditions of uncertainty.

Analyse the benefits and risks of using artificial intelligence in management processes under conditions of uncertainty.

Materials and Methods

The study is based on a number of general theoretical methods, principles and approaches. To achieve the goal and solve the research objectives, the following methods were used: theoretical, in particular, generalisation of theoretical data, comparison, synthesis - to determine the role of artificial intelligence in management and its impact on decision-making in uncertainty.

Results

It is important to note that changes in the modern business environment are driven by the high dynamism and instability of the external environment. This is due to the current challenges in the country, which intensify competition and encourage companies to use new technologies and business process management tools to find the optimal vector of strategic development. New market opportunities that emerge under the influence of the rapid development of science and technology will unlock the potential through the use of the latest tools in business process management using artificial intelligence (AI) and identify areas of application for business units to make the most of market opportunities [4, p. 1014]. AI is used to analyse large amounts of data and predict future trends. AI can make the evaluation of innovative projects more accurate and efficient, helping to identify patterns and correlations that are difficult to detect using traditional methods [6, p. 659].

Artificial intelligence can be interpreted not only as a technology that imitates human thinking, but also as a technology capable of self-learning. This means that artificial intelligence systems can create a kind of meta-algorithm that allows the system to solve non-standard tasks that it has never encountered before. In organisational management, such tasks are most often unstructured or unstructured decision-making processes. By “unstructured” decisions, we mean decisions that have a significant impact on the organisation's development prospects, the achievement of the formulated mission, and in most cases, only on the survival of the organisation. However, such decisions are characterised by a high degree of uncertainty about resources and results and cannot be justified by the probability of achieving the desired result [8, p. 716].

AI is increasingly integrated into management processes, significantly changing the way decisions are made. Its role in this area can be characterised as follows (Table 1):

Table 1

The role of artificial intelligence in management processes

Aspect	Features
Analysis and forecasting	AI allows companies to analyse large amounts of data to identify trends and predict future results. This helps managers make informed decisions based on real data.
Process optimisation	By automating routine tasks, such as document processing, inventory management, and logistics, AI can optimise operational processes, increasing the efficiency of a company.
Real-time decision-making	AI can process data in real time, allowing managers to respond quickly to changes in the market or in the organisation. For example, recommendation systems can help manage customer experience by offering personalised services.

Risk management	By using AI, organisations can better anticipate and manage risks, for example, by analysing financial data to identify possible threats or fraud.
Decision support	AI can serve as a decision support tool, providing managers with intelligent recommendations based on data analysis and modelling of various scenarios.

Source: created by the author based on [6]

Today's market is characterised by a high level of uncertainty and rapid change, which creates a number of challenges for managers. Technologies are evolving very rapidly, changing traditional business models and forcing companies to constantly adapt. In the face of uncertainty, management processes at enterprises are becoming much more complex, which explains the need to find new directions for the development of digital transformation.

Today, digital technologies in management accounting are becoming not just a tool for improving efficiency, but also a tool for survival and adaptation of companies to rapidly changing conditions. Modernisation and upgrading in the digital economy help companies to respond more quickly in the face of uncertainty and instability to prevent crises, optimise resources and maintain sustainability. Therefore, management accounting in the context of the development and integration of digital technologies opens up new prospects for improving management efficiency, especially in the complex and dynamic context of the modern business environment.

Effective management has become especially important for companies operating in an uncertain and unstable market, where consumer needs, competitive conditions and technologies are changing [10, p. 2]. The uncertainty and instability in Ukraine are causing serious and widespread changes in the country's business environment. These changes include not only direct damage to infrastructure, job losses and business disruption, but also disruptions in regional and international supply chains, changes in market demand and new challenges in logistics and resource management. This situation has made rapid adaptation to the changing situation a significant challenge for Ukrainian companies. Many companies have had to make management decisions and reorient their operations to tap new markets, optimise production processes and seek alternative sources of supply. Adaptation of management practices plays a key role in sustaining business and achieving high results. In this context, management accounting plays an important role in helping the company's management to make informed decisions in conditions of uncertainty and high risk [5, p. 3].

Integration of new technologies, including AI, is becoming a necessity for survival and development in the market. As access to information grows and society changes, consumers are becoming more demanding and knowledgeable. Companies need to quickly adapt their products and services to these changes, which can be done more efficiently with the help of AI. Globalisation creates a high level of competition, where companies must not only react quickly to changes but also proactively predict new trends using AI capabilities. Modern markets are subject to economic and political instability. AI can help companies develop strategies to minimise risks and adapt to new conditions.

Thus, the use of AI in management is becoming increasingly important for organisations seeking to maintain their competitiveness and efficiency in today's market.

Artificial intelligence has powerful analytical capabilities that allow organisations to analyse huge amounts of data and extract valuable insights from it. The main analytical capabilities of AI include (Table 2):

Table 2

Key analytical capabilities of AI under uncertainty

Opportunity	Features
Big Data processing	AI is able to process and analyse data from a variety of sources, including social media, email, web traffic, and financial transactions. This allows it to identify hidden patterns and trends that can be useful for decision-making.
Forecasting	Using machine learning and deep learning techniques, AI can predict future trends based on historical data. This helps managers make informed decisions, for example, about product demand, inventory optimisation, or financial performance forecasting.
Market and customer analysis	AI can analyse consumer behaviour, competitors, and general market conditions, allowing companies to better understand their customers' needs and adapt their products or services to market requirements faster.
Data visualisation	AI systems are able to create interactive dashboards and visualisations that make complex data more understandable for managers and facilitate decision-making.

Source: created by the author based on [2]

Artificial intelligence can automate routine tasks such as order processing, resource allocation, and big data analysis. This can reduce costs and increase efficiency; AI can analyse and optimise processes and suggest more efficient ways of doing things. For example, in logistics, AI can optimise delivery routes, reducing costs and delivery times; AI can perform routine tasks such as order processing and inventory control, allowing employees to focus on more important tasks.

Using customer data, AI can help businesses offer personalised products or services, improving customer experience and increasing customer loyalty. AI can be used to improve customer service by analysing customer queries and providing personalised responses and recommendations.

Robotic process automation based on artificial intelligence enables the automation of complex business processes, such as financial operations, customer service, and supply chain management. Artificial intelligence facilitates the emergence of new decision-making methods and significantly improves communication and organisational processes. AI provides real-time decision-making capabilities, which is critical in today's fast-paced business environment. Artificial intelligence can track market trends and changes in real time and provide managers with up-to-date information to make quick and effective decisions. For example, AI systems can automatically adjust prices based on supply and demand or change marketing strategies in response to consumer behaviour [9, p. 1272].

Thanks to AI's ability to quickly analyse data and make predictions, organisations can respond quickly to potential risks, such as fluctuations in financial markets or changes in legislation. This allows them to minimise potential losses and quickly adapt to new conditions.

AI can integrate with enterprise resource planning (ERP) systems, providing managers with intelligent recommendations and helping them make more informed decisions based on the analysis of current data [11, p. 79].

In an environment where customers expect instant responses, AI enables the delivery of high-quality service in real time. For example, AI-driven chatbots can respond to customer queries at any time, providing fast and efficient problem resolution.

Artificial intelligence can easily provide the necessary amount of information and create reliable scenarios of the consequences of management decisions. Today, most formalised tasks are solved with the help of information technology. Management decision support systems can rank possible alternatives and optimise the selection of the best management decision among the various alternatives offered. Of course, the choice of alternatives can be related to the psychological and analytical abilities of the decision maker or based on the capabilities provided by information technology and digital tools. It should be noted that although artificial intelligence has significantly expanded the possibilities of managerial decision-making, the human factor is still important for security, and therefore it is important to integrate artificial and human intelligence to ensure the safety and efficiency of international business activities [1, p. 112].

Thus, the introduction of AI into management processes helps companies make more efficient decisions, optimise business processes, and respond quickly to changes, which is a key success factor in the modern business environment.

The introduction of artificial intelligence (AI) into management decisions under uncertainty can provide several significant benefits (Table 3):

Table 3

Advantages of AI in management

Advantages	Features
Analysing large amounts of data	AI is able to quickly process and analyse huge amounts of data that may be difficult or impossible for humans to process manually. This allows you to get accurate results and draw reasonable conclusions based on real data, which significantly improves the quality of management decisions.
Forecasting and modelling	AI systems use machine learning algorithms to predict future trends and model various scenarios. This helps managers better understand the possible consequences of their decisions and choose the most effective strategy.
Reducing the impact of the human factor	People can make mistakes due to fatigue, stress, or subjective biases. AI operates on the basis of well-defined algorithms and data, which helps to reduce the impact of these factors on the decision-making process.
Speed of response	Thanks to the ability to process data in real time, AI allows you to respond quickly to changes in the market or in your organisation. This is especially important in today's dynamic business environment, where a delay in decision-making can lead to a loss of competitive advantage.
Automation of routine tasks	By performing routine and repetitive tasks, AI frees up time for managers to focus on strategic planning and key decision-making. It also increases efficiency and reduces the likelihood of human error in these processes.

Source: created by the author based on [15]

When used in the right way, AI can be a powerful tool for managing uncertainty by providing valuable information and decision support.

The introduction of artificial intelligence (AI) into management decisions under conditions of uncertainty can have several significant risks. Here are some of them (Table 4):

Table 4

Risks of AI implementation

Risk	Features
Bias of algorithms	AI algorithms are trained on historical data that may contain biases. If these biases are not recognised and corrected, AI can reinforce them and make decisions that discriminate against certain groups of people, such as gender or ethnicity.
Protection of confidential information	AI often uses large amounts of data, including sensitive customer information and internal company processes. This creates a risk of data breaches, especially if AI systems are subject to cyberattacks or misuse.
Automation and staff reduction	The introduction of AI could lead to the automation of many processes previously performed by humans. This could lead to job losses, especially in areas where many routine tasks can be automated, such as manufacturing, logistics and customer service.
Retraining of personnel	To maintain their role in the organisation, employees may need to retrain or acquire new skills to work with AI. This can be challenging and require a significant investment of time and resources on both the part of the company and the employees.

Source: created by the author based on his own observations

Thus, despite the significant benefits associated with the introduction of AI in management, potential risks must be taken into account. It is important to develop and implement ethical standards, ensure data security, and support employees in adapting to new technologies.

Introducing AI into management processes requires a strategic approach and readiness for change. Proper planning, selection of tools, effective data management, and, most importantly, staff training are key factors in the successful use of AI in business. It is important not only to invest in technology, but also in the people who will work with it, providing proper training and support to achieve maximum results.

Before implementing AI, it's important to identify the specific goals you want to achieve. These could be process optimisation, improved forecast accuracy, cost reduction, or faster decision-making. Assess which business processes will benefit most from AI implementation. Start with pilot projects in areas where you can get quick results and a measurable impact. It is worth starting with AI implementation on a small scale by implementing pilot projects. This will allow you to identify possible problems, test systems in real-world conditions, and adapt them before large-scale implementation. Constantly monitor the effectiveness of AI in management decision-making. Analyse the results and get feedback from users to identify opportunities for improvement. Implement improvements based on the analysis of results and new technological advances in AI. Respond flexibly to changes and adapt AI systems to meet new challenges. Recognise the potential risks associated with AI adoption, including technical

issues, organisational challenges, and potential ethical issues. Develop plans to mitigate and manage these risks. Prepare a contingency plan for changes in market conditions or new regulatory requirements. Ensure AI systems are flexible to adapt to unforeseen changes.

Successfully selected digital tools for automated management accounting will help to maintain and expand the capabilities of accounting for business processes, adapt to rapidly changing conditions, and effectively manage financial resources. The choice of a particular tool depends on the specifics of the business, the size of the enterprise and the available budget.

In Ukraine's current environment, the use of digital tools in management accounting has taken on a new meaning. Many Ukrainian companies are quickly adapting to the new environment by integrating digital solutions to support their operations: ERP systems such as SAP[14] and Microsoft Dynamics[15] are used to optimise resources and effectively manage supply chains. Logistics, in particular, is an integral part of modern business processes in a globalised world. The digital environment has made it possible to create a one-stop shop, similar to the concept of the Internet of Things. At the same time, despite technological advances and the growing automation of logistics processes, the physical delivery of resources and goods remains the most complex element of business processes. This has allowed companies to respond more quickly to new logistics routes and changes in supply, and QuickBooks[16] and Zoho Books are gaining popularity among SMEs looking for simpler and more cost-effective solutions for financial accounting, budgeting and cash flow management.

Conclusions

Thus, modern artificial intelligence technologies are of particular interest and are considered to be among the most promising. They bring both new opportunities and new threats that need to be taken into account when implementing and using them. Artificial intelligence technologies are actively developing and finding application in various areas, including corporate governance. One of the key areas of AI application in corporate governance is the decision-making process. The main advantages of using AI in this process include a significant increase in the amount of information to develop decision alternatives and reduce resource costs; rapid analysis of large amounts of data; development of reliable scenarios of decision consequences; improvement of the quality of decisions, including their impartiality and reduction of the risk of opportunistic attitudes that may conflict with corporate goals and values.

Artificial intelligence is becoming an indispensable tool for making management decisions in the face of uncertainty and rapid change. It allows companies to better understand the market, quickly adapt to new conditions and improve the efficiency of their processes. However, for the successful implementation of AI, ethical aspects, data quality, and staff training must be taken into account. Overall, the use of AI in management opens up new opportunities for organisations, allowing them to be more flexible, efficient and competitive.

Introducing AI into management processes in an environment of uncertainty and rapid change can significantly improve the quality of decision-making and increase an organisation's competitiveness. For a successful implementation, it is important to clearly define goals, ensure quality data, select appropriate tools, and train staff. Special attention should be paid to ethical aspects and data security. Continuous monitoring and improvement of AI systems will help to adapt to rapid market changes and maintain management efficiency.

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