Journal homepage: https://devma.com.ua/en

DEVELOPMENT MANAGEMENT

UDC 004.6
DOI: 10.63341/devt/2.2025.20

Vol. 24, No. 2. 2025

The impact of big data analytics on the effectiveness of management decisions

Dmytro Zelenyi*

Master
Kyiv National Economic University named after Vadym Hetman
03057, 54/1 Beresteiskyi Ave., Kyiv, Ukraine
https://orcid.org/0009-0003-2719-6357

Abstract. The aim of the study was to assess the impact of big data analytics on the quality of managerial decisions by analysing key technologies, data processing methods, and data interpretation in the modern business environment. The research methodology included the analysis and comparison of existing approaches to the use of big data analytics in various industries, as well as the application of case study and modelling methods to evaluate the impact of big data on the effectiveness of managerial decisions under conditions of unstable resource provision. The study also analysed the practical use of big data in finance, marketing, logistics, manufacturing, human resource management, and public administration based on real cases from companies such as Amazon, Uber, Walmart, General Electric, and Netflix. Types of machine learning algorithms (classification, clustering, regression, deep learning), examples of the application (customer segmentation, demand forecasting, anomaly detection), and the impact on the effectiveness of managerial decisions were described. Key technologies were outlined – Hadoop, Spark, and Tableau – which ensured the processing, analysis, and visualisation of big data. Emphasis was placed on the advantages of big data – improved forecasting accuracy, personalisation, automation, market adaptation – and the challenges of implementation, particularly the need for computational resources, qualified personnel, and data protection, which were critical for achieving managerial efficiency. The results obtained will allow enterprises to optimise operational processes, increase the efficiency of resource use, and adapt strategic decisions to specific market conditions and technological challenges. Furthermore, the study made it possible to improve the integration of big data analytics with other digital technologies, such as BIM and IoT, which contributed to more accurate forecasting and optimisation of business processes. The practical value of the study lies in identifying ways to effectively apply big data analytics to improve managerial decisions in various sectors

Keywords: information processing; forecasting; algorithmic approaches; process optimisation; artificial intelligence

Article's History: Received: 20.02.2025; Revised: 21.05.2025; Accepted: 27.06.2025

INTRODUCTION

The modern business environment was characterised by a rapid increase in data volumes and the necessity to make well-grounded managerial decisions in real time. In this context, big data analytics gained particular relevance as it enabled the identification of patterns, prediction of trends, and improvement of the efficiency of managerial processes. It contributed to the enhancement of strategic planning, reduction of risks, and increase in the competitiveness of organisations. At the same time, the implementation of big data was accompanied by a number of challenges – technical, personnel-related, and organisational. Insufficient integration of analytics into traditional management systems, data security issues, and a shortage of specialists complicated its effective use. Therefore, the study of the impact of big data analytics on decision-making processes remained an important and timely task.

Various studies indicated a significant impact of big data analytics on the effectiveness of managerial decisions. In the financial sector, G. Dicuonzo *et al*. (2019) drew attention to the use of big data to increase the accuracy of creditworthiness assessments of borrowers. In the view, a deep analysis of financial information reduced the risk of loan

Suggested Citation:
Zelenyi, D. (2025). The impact of big data analytics on the effectiveness of management decisions. *Development Management*, 24(2), 20-30. DOI: 10.63341/devt/2.2025.20.

*Corresponding author

defaults and helped to avoid systemic failures. The authors also emphasised the importance of sound managerial decisions in risk management. Z.P. Dvulit & L.V. Maznyk (2024) analysed the impact of big data analytics on corporate strategic management. The authors noted that modern data analysis tools contributed to more accurate planning and provided flexibility in decision-making, allowing companies to respond quickly to market changes. The approach of H.N. Dai *et al*. (2020) focused on the optimisation of operational activities of manufacturing enterprises. The conclusions confirmed that the integration of data analysis tools into production processes promoted more rational use of resources and accelerated product manufacturing cycles.

S.R. Krishna *et al*. (2023), in turn, emphasised the improvement of marketing practices through detailed consumer behaviour analysis. Owing to analytical technologies, companies were able to formulate more precise advertising campaigns and predict changes in demand, which led to increased efficiency. Logistics issues were examined by S. Maheshwari *et al*. (2021), focusing on improving the transparency and speed of supply chains. The study showed that due to the use of big data, interaction among participants in the process improved, and delivery costs were optimised. R.D. Raut *et al*. (2019) analysed how government institutions could strengthen the capacity to respond promptly in emergencies. Using crisis scenarios, the authors demonstrated how analytics helped to make well-founded managerial decisions quickly.

V. Kovalchuk *et al*. (2018) focused on improving human resource (HR) management processes. Due to the collected data on employees, organisations were able to better plan staffing needs, reduce turnover, and increase overall team efficiency. The view of C. Liu *et al*. (2021) was directed at innovation processes. The authors showed how a deep understanding of consumer expectations and market trends through data analysis helped reduce the risk of failure when launching new products and simultaneously increased the likelihood of commercial success. The work of L. Hanuschak-Efimenko (2024) focused on the identification and minimisation of risks in the business environment. Through threat forecasting based on data, companies were able to adapt quickly to changes, minimising financial losses. In the medical field, K. Batko & A. Ślęzak (2022) investigated how digital analytics contributed to improving the quality of medical services. The authors argued that its use allowed doctors to make clinical decisions more quickly and accurately, optimising healthcare institution expenditures.

Previous studies primarily focused on individual aspects of the impact of big data analytics, such as financial risks, HR, and supply chain optimisation, whereas the issues of integration into traditional management systems, influence on corporate culture, transformation of strategic management, as well as ethical, legal, and governmental aspects remained insufficiently explored. The aim of this study was to determine how the use of big data analytics transformed managerial approaches, influenced decision-making structures, and contributed to improving the efficiency of organisational processes, taking into account the challenges of integrating such technologies into existing management models. The objectives of the study were to define key aspects of big data analytics integration into management processes, to assess the impact of big data analytics on strategic decision-making in various fields of activity, and to examine the ethical and legal issues arising from the use of big data in management.

MATERIALS AND METHODS

For the purpose of the study within the big data analysis, a combination of theoretical and practical approaches was used, aimed at assessing the effectiveness of machine learning (ML) and artificial intelligence (AI) technologies in the processes of analysing and managing large volumes of information. The study also included the identification of the key characteristics of big data, such as volume, processing speed, and variety, as well as an analysis of data processing methods and the application in management processes. The theoretical aspect of the study covered the examination of basic concepts characterising big data, including the "3V" concept (Volume, Velocity, Variety), and the identification of the role of ML and AI in optimising big data processing. The study used major works and publications in the fields of big data, ML, and AI, as well as the latest studies related to the application of these technologies in various sectors, such as business processes, finance, marketing, and logistics. An analysis of secondary data from public databases and company reports was also carried out, which allowed a comprehensive understanding of the use of big data in various fields (Govindan *et al*., 2018; Basu *et al*., 2024).

The study was based on the analysis of real-life examples of big data use in different fields of activity, such as financial management, strategic planning, marketing, and logistics. Data were collected from open sources, including articles, academic research, company reports, and publications on the implementation of ML and AI technologies in business processes. For the analysis, secondary data collected from public databases and industry reports were used, which enabled the development of a holistic view of big data application across different fields. In order to provide deeper insight into the managerial aspects of big data use, case studies of companies such as Amazon, General Electric, Uber, and Walmart were analysed (Kemal, 2023; Batte, 2025; Case study: Walmart, 2025; Edmondson, 2025).

The methodological basis of the study was built on a combination of qualitative analytical approaches focused on the examination of the practical application of big data analytics across sectors. The use of thematic grouping made it possible to structure the information by key fields – finance, marketing, logistics, production, HR, and public administration. This allowed cross-sector comparisons and the identification of common trends, differences in big data implementation goals, and different forms of analytical process organisation.

One of the main methods was the case study, which made it possible to analyse specific examples of big data use at the company level. A number of well-known organisations were selected – such as Amazon, Uber, JPMorgan Chase, General Electric, IBM, as well as examples from the US public sector. The case analysis allowed for detailing the mechanisms of big data application in strategic and operational management, particularly in terms of service personalisation, demand forecasting, process reliability improvement, cost optimisation, and enhancing customer interaction. In parallel, a functional-target analysis was used, which enabled the systematisation of big data roles in management processes depending on industry specificity. Content analysis of reports, academic studies, and policy documents provided the empirical basis for identifying typical advantages and challenges during the implementation of big data analytics. Particular attention was given to aspects such as confidentiality, access to quality data, technical and personnel constraints, as well as institutional and regulatory barriers.

To create a comprehensive picture, a comparative-analytical approach was used, which allowed the analysis of differences in approaches to big data implementation across sectors, as well as the assessment of general trends and development prospects of analytical systems. The use of analytical generalisation made it possible to formulate conclusions regarding the role of big data in transforming management models, increasing business flexibility and adaptability, and enhancing the ability of organisations to proactively respond to change. Thus, the research methodology was based on a theoretical understanding of the role of big data in modern management, a combination of sectoral analysis with practical case study exploration, and a focus on the benefits, challenges, and strategic implications of implementing analytical solutions.

RESULTS

Big data analytics is the process of collecting, processing, and analysing large volumes of structured and unstructured information to identify patterns, trends, and useful insights for decision-making. A distinguishing feature of big data is its volume, processing speed, and variety (the "3V" concept). Volume refers to the enormous amount of information accumulated from different sources; velocity relates to the need for real-time or near real-time data processing; and variety means that the data can be represented in different formats – from text files to videos and streaming data. Additional characteristics include veracity, which defines the reliability of the obtained information, and value, which is the ultimate goal of big data analysis for making effective managerial decisions.

The big data analytics process includes several key stages: collecting information from various sources, processing and storing data using distributed computing systems, analysing, and visualising results. Modern technologies such as ML and AI enable efficient processing of large volumes of information and forecasting, which significantly improves the quality of managerial decisions (Guler *et al.*, 2024). Big data analytics plays a key role in modern management, as it provides managers with the ability to make well-grounded decisions based on factual data. It is actively used in strategic planning, enabling the analysis of market trends and competitive environments, thereby contributing to the development of effective long-term strategies. In operational management, big data enables real-time process monitoring, allowing for quick responses to changes in the business environment, while in resource planning it helps optimise the use of material and human resources.

The impact of big data analytics on the personalisation of decisions is also noteworthy, enabling companies to adapt products and services to individual customer needs. Furthermore, in automation and forecasting, AI and ML algorithms allow the prediction of future scenarios. Under modern conditions of high competition, companies that actively implement big data analytics gain significant advantages, especially in areas such as retail, finance, logistics, and public administration. In retail, big data helps forecast demand, optimise pricing, and manage inventory, while in the financial sector, it is used for credit risk assessment and fraud detection.

Thus, big data analytics becomes an integral part of modern management, enabling faster, more accurate, and more adaptive decision-making. It provides managers with up-to-date information necessary for effective responses to dynamic changes in the environment and contributes to improving organisational competitiveness (Badshah *et al.*, 2024). However, its effective use requires not only technological infrastructure but also proper personnel training, integration with traditional management methods, and consideration of ethical and legal aspects related to the use of large volumes of data. ML and AI are key technologies for processing big data, as these technologies enable automated analysis, identification of hidden patterns, and highly accurate forecasting of future events. The use of these technologies significantly improves the quality of managerial decisions, as it allows for fast processing of large data volumes, detection of trends, and adaptation of business strategies in real time. ML is a subset of AI that enables computer systems to learn from existing data without explicit programming. It operates through algorithms that analyse large data sets, identify patterns, and use the algorithms to make predictive decisions. The most common ML methods are supervised learning, unsupervised learning, and reinforcement learning.

Supervised learning involves using labelled data, where the algorithm learns to find relationships between input parameters and expected outcomes. This approach is widely used in financial analytics to forecast market price changes, in banking to assess customer creditworthiness, and in marketing for audience segmentation. Unsupervised learning is used when data lacks clear labels, and the algorithm independently searches for structure within large data sets. This method is effective for detecting fraudulent activities, optimising logistics processes, and building recommendation systems. Reinforcement learning is based on reward and penalty mechanisms, enabling the creation of complex decision-making models, for example in robotics or automated production control (Shetty *et al.*, 2022).

AI combines various technologies, including neural networks, deep learning, natural language processing, and cognitive computing, allowing computer systems to imitate human thinking. In the field of big data processing, AI is used for automating analytics, forecasting risks, analysing user behaviour, and improving the effectiveness of managerial decisions. For example, in manufacturing, AI helps predict equipment failures, preventing unplanned downtimes, and in healthcare, it analyses large volumes of patient data for early disease diagnosis.

The key advantage of ML and AI in big data analytics is the ability to process information quickly without losing accuracy. Traditional statistical analysis methods often fail to work effectively with dynamic, distributed, and unstructured data, whereas AI algorithms adapt to new conditions and improve the forecasts during operation. Such systems are widely used in the financial sector for detecting fraud, in retail for personalising customer offers, and in industry for optimising supply chains (Iqbal *et al.*, 2020).

The use of ML and AI for processing big data also faces challenges. Chief among these challenges is the need for high-quality training data, as models can yield incorrect results due to inaccurate or insufficient data. Another aspect is computing resources, since complex AI algorithms require significant computational power for training models. In addition, ethical and privacy issues remain relevant, as ML algorithms can use sensitive personal data, necessitating compliance with appropriate regulatory standards.

Thus, ML and AI significantly improve the efficiency of big data processing, enabling faster and better-informed managerial decisions. These technologies open new opportunities for analysing complex processes and forecasting trends, which is particularly important for business, public administration, the financial sector, healthcare, and many other fields (Sen *et al*., 2020). Despite certain implementation challenges, the development prospects of AI and ML in the big data field remain exceptionally large, and the influence on decision-making will only increase in the future.

Big data analytics plays a critical role in business process optimisation and effective resource planning, allowing companies to obtain valuable insights, increase productivity, and reduce operational costs. The use of big data helps businesses not only analyse previous events but also forecast future trends, enabling the implementation of more effective resource management strategies. Business processes cover all aspects of a company's operations – from production to customer service. Big data analytics significantly improves the efficiency of these processes, automates routine tasks, and reduces costs.

One of the main areas of optimisation is the automation of workflows. Due to ML algorithms, companies can reduce the need for manual data processing, implement robotic management systems, and reduce the likelihood of human error. For example, in finance, big data helps automate transaction processing, assess customer creditworthiness, and detect fraud schemes. Another important aspect is the optimisation of customer interaction. Big data analytics enables companies to analyse consumer behaviour, personalise services, and forecast customer needs. For example, retail companies use big data to create recommendation systems that suggest the most relevant products based on previous purchases and customer behaviour.

In the manufacturing sector, big data is used to monitor equipment, predict possible malfunctions, and provide timely maintenance. The use of IoT sensors in combination with big data analytics enables real-time diagnostics and helps prevent emergency situations. One of the key areas of big data impact is improved resource planning. Big data analytics helps companies accurately forecast needs for material, financial, and human resources, allowing for reduced excess costs and increased resource efficiency (Yu *et al*., 2019; Koshchii, 2023). Demand forecasting is one of the most important aspects of resource planning. Analysing large datasets allows companies to predict market changes, taking into account seasonality, economic trends, social factors, and consumer behaviour. For example, logistics and retail companies use big data for inventory planning to avoid shortages or surpluses.

Supply chain optimisation also largely depends on big data analytics. By analysing logistics data in real time, companies can adjust delivery routes, optimise warehouse storage, and minimise delays. For example, transport companies use big data to analyse traffic, weather conditions, and road status, enabling optimised transport and reduced fuel costs (Gopal *et al*., 2024). HR is another important area where big data provides significant advantages. Analytics helps forecast workforce needs, optimise work schedules, and improve employee performance. For example, companies analyse employee productivity and identify optimal motivation methods or workload distribution. Financial planning also benefits, with big data analytics helping organisations analyse cash flows, forecast revenues and expenses, and make more informed investment decisions. Banks and financial institutions use big data to identify risks, prevent financial fraud, and improve customer service (Ayvaz & Alpay, 2021).

Amazon uses big data analytics to forecast product demand, optimise supply chains, and personalise offers for customers (Edmondson, 2025). General Electric implements big data to monitor industrial equipment and predict maintenance needs, reducing repair costs (Batte, 2025). Uber uses big data analysis to optimise driver allocation, reduce customer wait times, and improve dynamic pricing algorithms (Kemal, 2023). Walmart analyses billions of transactions daily to manage inventory, forecast sales, and enhance customer service (Case study: Walmart, 2025). Thus, big data analytics plays a decisive role in enhancing business process efficiency and resource planning. It enables companies to make more accurate managerial decisions, boost productivity, cut costs, and adapt more quickly to market changes. Big data opens new opportunities for supply chain optimisation, demand forecasting, process automation, and improved customer interaction. Despite some challenges, such as the need for substantial computing power and highly skilled specialists, companies actively using big data analytics gain significant competitive advantages and increase long-term effectiveness.

Big data analytics has a significant impact on the effectiveness of managerial decisions across various areas of activity. The use of modern data analysis methods not only simplifies decision-making processes but also makes such processes more accurate, adaptive, and effective. Big data facilitates business process automation, productivity increases, risk minimisation, and improved strategic planning. One of the key areas of big data implementation is financial management, where transaction analysis helps prevent fraud, and predictive analytics allows for more informed investment decisions. In marketing, big data is used for advertising personalisation and more effective customer segmentation, increasing sales and customer loyalty. Logistics and supply chains also actively use analytics to optimise routes and reduce transport costs.

In HR, big data analytics enables forecasting staff turnover, analysing employee performance, and optimising personnel processes. In the manufacturing sector, big data supports equipment monitoring and maintenance forecasting, reducing downtime risks. Big data is also actively used in healthcare for disease diagnosis, epidemic forecasting, and personalised treatment. Public administration also benefits from big data analytics. Through the analysis of social and economic indicators, public authorities are able to plan policies more effectively, respond to crisis situations, and deliver higher quality services to citizens. Table 1 presents the main areas of big data use in management, the expected effects, and implementation challenges.

Table 1. Big data impact on the effectiveness of management decisions in various areas of activity

Management sphere	Examples of using big data	Expected effect	Implementation challenges
Financial management	Transaction analysis to detect fraud, predict investment risks	Reducing financial risks, improving profitability	Data protection, regulatory compliance
Strategic planning	Analysis of market trends, competitive environment, consumer behaviour	Making informed strategic decisions	Large amount of data, complexity of integration
Marketing	Advertising personalisation, customer segmentation, social media feedback analysis	Increasing customer loyalty, campaign effectiveness	Privacy issues, the need for AI analytics
Logistics and supply	Optimisation of delivery routes, inventory management	Reducing costs, increasing delivery speed	Lack of qualified specialists, difficulty of integration
HR	Employee productivity analysis, staff turnover forecasting	Optimisation of personnel policy, increase in productivity	Personal data protection, ethical issues
Production	Equipment condition monitoring, predictive maintenance	Reduced downtime, reduced repair costs	Investments in IoT and analytics
Public administration	Analysis of social and economic indicators, crisis forecasting	Improving public administration, policy effectiveness	The need for open data, information security

Source: developed by the author based on M. Seyedan & F. Mafakheri (2020), Y. Zhang *et al*. (2021), S. Bilohur (2025)

As seen in Table 1, big data analytics significantly improves the quality of managerial decisions across various fields. It enables the optimisation of business processes, cost reduction, productivity growth, and the adoption of more reasoned decisions. However, the implementation of big data also raises certain challenges, particularly concerning security, privacy, the need for highly qualified specialists, and integration with existing systems. Therefore, the use of big data analytics in modern management is essential for enhancing the competitiveness of companies and organisations. Given the rapid pace of technological development, the effective application of big data allows not only adaptation to changes but also proactive development of strategies in the digital economy.

Big data plays a key role in improving managerial decisions by providing companies with the ability to adapt more quickly to market changes, optimise processes, and increase operational efficiency. The use of modern data analysis technologies allows executives to make more informed decisions, reduce risks, and improve productivity. One of the main areas for enhancing decision-making based on big data is the automation of the decision-making process. The use of ML and AI minimises the influence of the human factor, as automated systems can process vast amounts of information and provide managers with ready-made analytical reports or recommendations on optimal actions. An important aspect is the personalisation of management strategies, as the analysis of behavioural patterns of employees, clients, and partners makes it possible to develop individual approaches to motivation, staff development, and customer service.

Big data analytics also contributes to more effective resource planning, allowing for forecasting of needs in materials, equipment, personnel, and finances. This helps reduce costs related to excessive stock and minimise downtime in production processes. Additionally, the use of predictive analytics algorithms enables the anticipation of changes in demand, financial risks, market fluctuations, and potential supply chain issues, allowing companies to develop effective response strategies. Moreover, big data helps improve risk management processes, as analysis of historical and current data enables real-time risk assessments. This is particularly important in finance, insurance, logistics, and HR.

The use of big data also improves operational efficiency, as companies can identify bottlenecks in business processes and eliminate inefficiencies. For instance, data analysis allows the optimisation of logistics routes, enhancement of employee productivity, and automation of repetitive tasks. The improvement of marketing strategies is another key area of big data application (Lehenchuk & Zavalii, 2023). Data on consumer behaviour, social media, website analytics, and CRM systems help companies tailor advertising campaigns, personalise offers for each client, and boost marketing effectiveness.

A significant contribution to improved decision-making comes from the development of real-time decision-making systems. The use of streaming data processing technologies, such as Apache Kafka and Apache Flink, enables instant analytical insights, which are critical in fields where decisions have to be made quickly, such as financial markets, transportation, or security. Furthermore, the integration of IoT and big data into management processes provides detailed information about production operations, equipment status, and logistics processes, helping reduce downtime, improve equipment efficiency, and lower repair and maintenance costs.

Finally, big data promotes the development of a corporate culture based on data-driven decision-making rather than intuition. This fosters more transparent and effective management at all levels of the organisation. The implementation of big data becomes a strategic priority for companies striving for digital transformation and enables significant cost reduction, improved business decision-making efficiency, and competitive advantages. Companies capable of overcoming the challenges related to big data implementation can not only improve operational efficiency but also ensure long-term growth in a dynamic business environment. Despite the considerable advantages of big data analytics, its integration into business processes involves a range of challenges. Companies face high infrastructure and software costs, data privacy issues, a shortage of qualified professionals, and difficulties integrating with existing management systems. Additionally, data quality and structure remain a major concern. Many organisations operate with fragmented information sources, complicating data processing and analysis. Low processing speed of large volumes of data can also negatively affect the effectiveness of managerial decisions. Table 2 presents the main challenges of big data implementation, the causes of their emergence, potential solutions, and real-life examples from practice.

Table 2. Challenges of implementing big data in business processes and ways to overcome the challenges

Challenge	Cause of occurrence	Possible ways to overcome	Practical examples
High implementation cost	The need for powerful equipment, software, and specialists	Use of cloud technologies, server rental, phased implementation	Small and medium businesses often choose AWS, Google Cloud
Lack of qualified personnel	Demand for data analysis professionals exceeds supply	Staff training, engagement of external consultants	Large corporations create internal educational programs
Data privacy issues	Regulatory requirements, threat of information leaks	Use of encryption, compliance with standards General Data Protection Regulation, ISO 27001	Banks are implementing multi-layered data protection
Difficulty in integrating with legacy systems	Traditional IT systems are not adapted to processing big data	Using APIs, gradual modernisation of IT infrastructure	Many companies are implementing hybrid systems
Data quality and structure	Data may be incomplete, unstructured, outdated	Using data cleaning and normalisation algorithms	AI helps improve data quality
Difficulty in interpreting results	Large amounts of data require specialised analytical skills	Using visualisations, BI systems, simplifying interfaces	Popular BI tools: Power BI, Tableau
Data processing speed	The constant growth of information creates delays in analysis	Using stream processing (Spark, Kafka), optimising algorithms	Payment processing companies are using real analytics

Source: developed by the author based on S. Bag *et al*. (2020), A. Bozkurt *et al*. (2023), Z.P. Dvulit & L.V. Maznyk (2024)

For the effective implementation of big data in business, it is necessary not only to invest in technology but also to ensure adequate staff training, the implementation of security standards, and the adaptation of organisational processes. The use of cloud services and automated analytical systems significantly reduces costs and improves data management efficiency. An important direction is also the development of AI and ML, which help enhance data processing quality, interpretation, and managerial decision-making. Companies that successfully integrate big data into the business processes gain a competitive advantage due to the ability to rapidly analyse the market, personalise customer offers, and optimise resources. Thus, despite the existing challenges, the use of big data becomes a necessary tool for companies striving for digital transformation and greater operational efficiency.

During the research, examples of big data application in six key sectors are systematised, with a real-life case provided for each, describing specific technologies, tasks, models, parameters, and achieved results. In the financial sector, JPMorgan Chase uses supervised learning algorithms, particularly logistic regression and decision trees, to detect fraudulent transactions and assess credit scores. Hadoop is used for storing historical transactions, Spark for stream data processing, and Tableau for visualising risky customer segments (How JPMorgan uses Hadoop…, 2024).

In logistics, Uber applies reinforcement learning algorithms combined with the Spark platform for adaptive demand management and dynamic pricing (How Uber uses data science…, 2024; Verma, 2024). Models account for factors such as traffic, weather, demand history, and user behavioural patterns. In the manufacturing sector, General Electric, via the Predix platform, implements analytics of telemetry data for predictive maintenance (Mistry, 2025). Results are displayed through interactive dashboards in Tableau. In HR, IBM introduces analytics based on unsupervised learning (principal component analysis, density-based spatial clustering of applications with noise) to identify key factors of employee turnover (Maloku & Maloku, 2024; Nfise, 2025). In public administration, exemplified by the US government (notably the SEC), big data is used to analyse public comments on regulatory acts using topic modelling and clustering (Eggers *et al*., 2019).

In retail, Amazon uses TensorFlow, Spark, and Hadoop to analyse user behaviour, build recommendation systems, and forecast demand (Chung, 2016). The main implementation challenges of big data are ethical risks related to the use of personal data without informed consent – especially relevant in HR and finance; resource constraints due to the high cost of infrastructure for data storage, processing, and security, posing a major barrier for mid-sized companies; a lack of qualified data analytics, data science, and ML specialists; data fragmentation across incompatible formats in many industries; and institutional resistance, where management structures are not always ready for process changes.

Among practical recommendations are the formation of interdisciplinary teams combining technical, ethical, and managerial competencies; the introduction of responsible big data usage standards, including algorithmic transparency; the selection of tools aligned with sectoral needs – Spark for stream computing, Hadoop for storage, TensorFlow for model building, and Tableau for visualisation; a modular approach to integrating analytics platforms into company architecture; and gradual solution scaling with a focus on results rather than data volume.

The research presents examples of big data applications in five key areas. In retail, Walmart processes over 2.5 petabytes of data per hour using Hadoop for data storage and analytics. The company applies predictive analytics based on historical sales, weather, and social media data, allowing for stock optimisation and improved customer service, especially ahead of natural disasters. In transport, Uber analyses more than 100 petabytes of data daily using Spark and reinforcement learning algorithms to predict demand, pricing, and driver distribution. This results in optimised customer wait times and improved service efficiency. In manufacturing, General Electric uses the Predix platform to collect telemetry data from industrial equipment. Clustering and time-series analysis enable predictive maintenance, reducing downtime by 25% and cutting costs. In HR, IBM uses unsupervised learning algorithms to analyse employee turnover, reducing staff losses and accelerating hiring. In public administration, the US government applies topic modelling to analyse public comments, enhancing decision-making quality and civic feedback.

At the same time, a number of challenges are identified. Firstly, privacy concerns – large volumes of personal data can be misused without proper safeguards. Secondly, a shortage of qualified specialists hinders complex analytics system implementation. The third challenge is technical constraints, particularly real-time unstructured data processing, which requires high computing power. Finally, institutional resistance remains a significant barrier, as traditional management structures are often unprepared for the integration of advanced digital approaches.

In response to these challenges, several practical recommendations are formulated. These include the integration of interdisciplinary teams to ensure a comprehensive view in data-related work; the development of clear ethical standards for data collection and use; investments in infrastructure for data storage and processing; increasing employees' digital literacy and implementing training in analytics tools. The presented cases demonstrate the effectiveness of big data in decision-making, productivity improvement, and adaptation to rapid environmental changes, while also highlighting the importance of conscious and ethically responsible technology implementation.

In the financial sector, an example is JPMorgan Chase (Sonica, 2025), which uses big data for detecting fraudulent transactions and analysing credit risk through supervised learning algorithms such as decision trees and logistic regression. In marketing, Amazon effectively uses Hadoop, Spark, and TensorFlow to analyse user behaviour, personalise recommendations, forecast demand, and implement dynamic pricing (Chimi, 2025). In logistics, Uber serves as an example of a company applying big data for real-time driver allocation, reducing customer wait times, and enabling dynamic pricing (Tambuskar, 2025). The system analyses over 100 petabytes of data using Spark and reinforcement learning for adaptive demand management. In manufacturing, General Electric introduces the Predix platform to analyse sensor data from equipment for predictive maintenance (How GE uses AI..., 2024). With ML algorithms, Predix identifies anomalies and predicts potential failures, reducing unplanned downtime and repair costs.

Big data implementation involves several challenges. The first is data privacy, particularly pressing in healthcare, banking, and public governance. Solutions involve restricted access policies, anonymisation and pseudonymisation methods, and adherence to international data protection standards (e.g., GDPR). The second challenge is data quality – missing, noisy, or inconsistent records hinder analysis and model training. The response includes preprocessing, data validation, and filtering algorithms. The third challenge is technical limitations – processing large data volumes requires significant computing resources and specialised tools (Ridzuan & Wan Zainon, 2019). Solutions include Hadoop (distributed storage and processing), Spark (real-time computing), TensorFlow (deep learning modelling), Tableau (interactive visualisation), and Matplotlib (scientific plotting in Python).

With regard to ML algorithms, supervised learning (e.g., support vector machines, decision trees, gradient boosting) is used for demand forecasting, risk assessment, and recommendation systems; unsupervised learning (k-means, DBSCAN, PCA) is used for customer segmentation and anomaly detection; and reinforcement learning (Q-learning, Deep Q-networks) is used for logistics route optimisation, dynamic pricing, and autonomous decision-making in changing environments. Each approach delivers managerial benefits – from cost reduction and improved forecasting accuracy to real-time decision adaptability. Thus, the application of big data demonstrates substantial potential for transforming management processes in finance, marketing, logistics, manufacturing, HR, and the public sector. However, to fully realise this potential, technical solutions need to be complemented by addressing issues of ethics, data quality, scalability, and tool adaptation to sectoral specifics.

DISCUSSION

Big data analytics plays a critically important role in modern management, enabling the processing of large volumes of information for informed decision-making. V. Marinakis *et al*. (2020) studied the use of big data analytics in the context of energy infrastructure, focusing on consumption forecasting and anomaly detection in the operation of technical systems based on data from IoT devices. The authors applied ML algorithms for real-time stream data processing, which significantly improved decision-making efficiency in energy management. One of the main advantages of big data is its ability to rapidly analyse large data sets in real time, allowing companies to respond quickly to market changes, forecast demand, reduce costs, and improve strategic planning. S. Talwar *et al*. (2021) examined the use of big data for operational supply chain management in retail, which led to a 20% reduction in excess inventory and a 25% improvement in demand forecasting. Both approaches demonstrated the advantages of big data in quick decision-making.

Big data analytics contribute to personalisation of decisions, allowing companies such as Amazon, Netflix, and banks to better understand consumer needs and offer products and services tailored to individual preferences, significantly improving customer experience and business efficiency. V.M. Reddy & L.N. Nalla (2024) investigated the impact of big data on customer experience personalisation in e-commerce, particularly recommendation algorithms, which increased purchase conversion by 30%. While both approaches demonstrated the effectiveness of personalised solutions, the authors emphasised consumer interaction.

ML and AI algorithms play a significant role in big data development, enabling automation of analysis and more accurate forecasting. The use of these technologies in finance, manufacturing, healthcare, and other sectors substantially improves the quality of managerial decisions. For instance, in manufacturing, ML helps identify potential equipment failures, preventing breakdowns and reducing maintenance costs. S.R. Krishna *et al*. (2023) explored ML algorithms in the financial sector, focusing on automating credit scoring and forecasting market risks. The results showed that using big data and AI reduced the share of non-performing loans by 15% and improved client solvency assessment accuracy. The key difference was in the subject area: the authors explored big data analytics in finance for risk reduction.

However, despite significant advantages, the implementation of big data faces several challenges. One of the main issues is the need to process massive volumes of information, which requires powerful computing resources and specialised software. Companies lacking the appropriate infrastructure might struggle with big data implementation, slowing down digital transformation. H.N. Dai *et al*. (2020) studied the challenges of big data implementation in manufacturing logistics, focusing on data integration from heterogeneous sources, insufficient data quality, and difficulty in building efficient real-time analytical models. Unlike the current study, which emphasised strategic planning and forecasting in resource management, the authors highlighted operational barriers arising during the adaptation of analytics to dynamic manufacturing and supply chain conditions. This comparison underlined the importance of a comprehensive approach addressing both strategic and tactical aspects of big data application in industrial environments.

D.K. Nguyen *et al*. (2023) studied how big data and AI algorithms could be used to detect and assess financial risks in the banking sector. It was found that big data analytics allowed banks to significantly reduce the likelihood of credit errors, detect potentially fraudulent operations, and better forecast changes in financial markets. The authors also noted that AI integration enables banks not only to detect anomalies in a timely manner, but also to automatically adapt the risk management strategies in real time. The current study also focused on using big data and AI to improve management decision efficiency, but the authors placed greater emphasis on financial aspects and risks. Additionally, the authors devoted more attention to automation and optimisation based on AI.

Another important issue is data privacy and protection. The use of large volumes of information, especially personal user data, poses risks of confidentiality breaches and requires strict regulatory compliance. This is particularly relevant amid increasing data protection legislation, such as the General Data Protection Regulation in the EU. A.T. Oyewole *et al*. (2024) investigated privacy challenges in the financial sector and found that the main problem was not only GDPR compliance but also the growing risk of data leaks due to targeted cyberattacks, increasingly aimed at banks and financial institutions. The authors analysed cryptographic protection mechanisms and approaches to monitoring anomalous activity to prevent compromise of sensitive financial information. The main difference was that the work focused primarily on protecting client financial data and ensuring regulatory compliance.

Data quality is also a critical issue. Poorly structured or noisy data can distort analysis results, leading to incorrect management decisions. Therefore, developing effective methods of data cleansing, normalisation, and verification is essential before analysis. K.O. Park (2020) investigated the problem of data quality in logistics, where poor or noisy data could lead to incorrect demand forecasting, thereby increasing storage and transportation costs. The author stressed the importance of implementing effective data cleansing and normalisation methods at the collection and processing stage to avoid such issues.

M. Ghasemaghaei & H. Calic (2020) also explored the use of big data to improve management decision-making but focused more on applying these technologies in the financial sector, particularly to improve credit risk assessment and detect financial anomalies. The authors noted that big data analytics made it possible to identify trends invisible to traditional analysis methods, thus improving the accuracy of predictive models. In contrast to the current results, the authors concentrated on the financial sphere, especially the need to dynamically update analytical algorithms to adapt to changing financial instruments. This highlighted the sector-specific nature of big data use and differing approaches to solving analytical tasks.

M.A. Khan *et al*. (2020) analysed the use of ML for demand forecasting in retail through big data analysis. The authors found that using ML for demand prediction enabled more accurate real-time forecasting of product demand, reducing inventory storage costs. Big data use in retail helped develop new models for optimising product placement in warehouses and stores, improving delivery efficiency and reducing logistics costs. However, the authors noted that such models require high data quality, and problems with incomplete or noisy data can seriously affect forecasting accuracy. Comparison with current results showed that both studies focused on using big data for business process forecasting and optimisation in retail. However, the authors' work emphasised offer personalisation for end consumers, whereas the current study placed greater focus on inventory and logistics process optimisation. The research findings indicate that using big data significantly improves decision-making efficiency, optimises resource management, and enables personalised services for consumers. However, implementing this technology is not without challenges, including data volume processing, data privacy assurance, and the need for clean, structured input data.

CONCLUSIONS

In the course of the conducted study, key approaches to the implementation of big data analytics across various management domains – including finance, marketing, logistics, manufacturing, HR, and public administration – were analysed. The findings confirmed that the use of big data in combination with ML algorithms, stream data processing, and distributed computing systems delivered significant effects in each of the examined sectors. In the financial sector (e.g., JPMorgan Chase), the implementation of fraud detection and credit risk assessment systems using supervised learning (gradient boosting) improved forecasting accuracy and reduced financial losses. At the same time, the study highlighted key challenges in the implementation of big data. The most significant of these included: low data quality, which reduced the reliability of analytics; limited computing resources for processing stream or large data volumes in real time; and confidentiality risks associated with the storage and analysis of personalised information.

Additionally, the research addressed the institutional and organisational conditions under which the implementation of big data technologies demonstrated the highest efficiency. Consideration was given to the level of digital maturity within organisations, employee readiness to work with new tools, and the existence of regulatory frameworks for data protection. The practical significance of the study lay in forming a systemic understanding of the role of big data analytics in transforming managerial decisions, enhancing operational efficiency, and adapting to dynamic environmental conditions. The summarised findings could be used to develop digital transformation strategies at both company and industry levels. Further research should focus on comparative analysis of the effectiveness of big data solutions in specific sectors – particularly in finance, logistics, and public administration – by incorporating up-to-date data, assessing the impact of implemented technologies on key performance indicators, and analysing barriers to the scaling. The main limitation of the study was its reliance on secondary sources and the absence of empirical validation of the models in practice. Future studies are planned to conduct an in-depth analysis of the effectiveness of big data solutions in selected sectors using primary data and quantitative metrics.

ACKNOWLEDGEMENTS
None.

FUNDING
None.

CONFLICT OF INTEREST
None.

REFERENCES

[1] Ayvaz, S., & Alpay, K. (2021). Predictive maintenance system for production lines in manufacturing: A machine learning approach using IoT data in real-time. *Expert Systems with Applications*, 173, article number 114598. doi: 10.1016/j.eswa.2021.114598.
[2] Badshah, A., Daud, A., Alharbey, R., Banjar, A., Bukhari, A., & Alshemaimri, B. (2024). Big data applications: Overview, challenges and future. *Artificial Intelligence Review*, 57(11), article number 290. doi: 10.1007/s10462-024-10938-5.
[3] Bag, S., Wood, L.C., Xu, L., Dhamija, P., & Kayikci, Y. (2020). Big data analytics as an operational excellence approach to enhance sustainable supply chain performance. *Resources, Conservation and Recycling*, 153, article number 104559. doi: 10.1016/j.resconrec.2019.104559.
[4] Basu, R., Aktar, M.N., & Kumar, S. (2024). The interplay of artificial intelligence, machine learning, and data analytics in digital marketing and promotions: A review and research agenda. *Journal of Marketing Analytics*, 13, 267-287. doi: 10.1057/s41270-024-00355-6.
[5] Batko, K., & Ślęzak, A. (2022). The use of big data analytics in healthcare. *Journal of Big Data*, 9(1), article number 3. doi: 10.1186/s40537-021-00553-4.
[6] Batte, B. (2025). Business process redesign: A case study of General Electric (GE). *SSRN*. doi: 10.2139/ssrn.5126465.
[7] Bilohur, S. (2025). The concept of the big data economy and the digital economy: Challenges and directions of development. *Humanities Studies*, 22(99), 236-247. doi: 10.32782/hst-2025-22-99-26.
[8] Bozkurt, A., Ekici, F., & Yetiskul, H. (2023). Utilizing Flink and Kafka technologies for real-time data processing: A case study. *The Eurasia Proceedings of Science Technology Engineering and Mathematics*, 24, 177-183. doi: 10.55549/epstem.1406274.
[9] Case study: Walmart. (2025). Retrieved from https://www.digitalproductanalytics.com/cases/walmart/.
[10] Chimi, C. (2025). *Amazon e-commerce analytics with PySpark*. Retrieved from https://github.com/ChristianChimi/PySpark-Amazon-Analytics.
[11] Chung, K. (2016). *Generating recommendations at Amazon scale with Apache Spark and Amazon DSSTNE*. Retrieved from https://aws.amazon.com/blogs/big-data/generating-recommendations-at-amazon-scale-with-apache-spark-and-amazon-dsstne.
[12] Dai, H.N., Wang, H., Xu, G., Wan, J., & Imran, M. (2020). Big data analytics for manufacturing internet of things: Opportunities, challenges and enabling technologies. *Enterprise Information Systems*, 14(9-10), 1279-1303. doi: 10.1080/17517575.2019.1633689.
[13] Dicuonzo, G., Galeone, G., Zappimbulso, E., & Dell'Atti, V. (2019). Risk management 4.0: The role of big data analytics in the bank sector. *International Journal of Economics and Financial Issues*, 9(6), 40-47. doi: 10.32479/ijefi.8556.
[14] Dvulit, Z.P., & Maznyk, L.V. (2024). The role of business analytics in the era of big data: New opportunities for managerial decision-making. *Management and Entrepreneurship in Ukraine: Stages of Formation and Problems of Development*, 6(2), 152-165. doi: 10.23939/smeu2024.02.152.
[15] Edmondson, J. (2025). *Big data use case: How Amazon uses big data to drive ecommerce revenue*. Retrieved from https://www.businesstechweekly.com/operational-efficiency/data-management/big-data-use-case.
[16] Eggers, W.D., Mallk, N., & Gracle, M. (2019). *Using AI to unleash the power of unstructured government data*. Retrieved from https://www2.deloitte.com/us/en/insights/focus/cognitive-technologies/natural-language-processing-examples-in-government-data.html.
[17] Ghasemaghaei, M., & Calic, G. (2020). Assessing the impact of big data on firm innovation performance: Big data is not always better data. *Journal of Business Research*, 108, 147-162. doi: 10.1016/j.jbusres.2019.09.062.
[18] Gopal, P.R., Rana, N.P., Krishna, T.V., & Ramkumar, M. (2024). Impact of big data analytics on supply chain performance: An analysis of influencing factors. *Annals of Operations Research*, 333(2), 769-797. doi: 10.1007/s10479-022-04749-6.

[19] Govindan, K., Cheng, T.E., Mishra, N., & Shukla, N. (2018). Big data analytics and application for logistics and supply chain management. *Transportation Research Part E: Logistics and Transportation Review*, 114, 343-349. doi: 10.1016/j.tre.2018.03.011.
[20] Guler, N., Kirshner, S.N., & Vidgen, R. (2024). A literature review of artificial intelligence research in business and management using machine learning and ChatGPT. *Data and Information Management*, 8(3), article number 100076. doi: 10.1016/j.dim.2024.100076.
[21] Hanuschak-Efimenko, L. (2024). Efficiency of innovative business management based on big data: Changing the role of managers. *Herald of Khmelnytskyi National University. Economic Sciences*, 336(6), 335-342. doi: 10.31891/2307-5740-2024-336-54.
[22] How GE uses AI for predictive maintenance to reduce downtime and increase efficiency. (2024). Retrieved from https://profeshh.com/2024/11/12/how-ge-uses-ai-for-predictive-maintenance-to-reduce-downtime-and-increase-efficiency.
[23] How JPMorgan uses Hadoop to leverage big data analytics? (2024). Retrieved from https://www.projectpro.io/article/how-jpmorgan-uses-hadoop-to-leverage-big-data-analytics/142.
[24] How Uber uses data science to reinvent transportation? (2024). Retrieved from https://www.projectpro.io/article/how-uber-uses-data-science-to-reinvent-transportation/290.
[25] Iqbal, R., Doctor, F., More, B., Mahmud, S., & Yousuf, U. (2020). Big data analytics: Computational intelligence techniques and application areas. *Technological Forecasting and Social Change*, 153, article number 119253. doi: 10.1016/j.techfore.2018.03.024.
[26] Kemal, E. (2023). *Uber's data-driven transformation: Solving challenges, achieving success, and inspiring innovation*. Retrieved from https://is.gd/yTo3c0.
[27] Khan, M.A., Saqib, S., Alyas, T., Rehman, A.U., Saeed, Y., Zeb, A., Zareei, M., & Mohamed, E.M. (2020). Effective demand forecasting model using business intelligence empowered with machine learning. *IEEE Access*, 8, 116013-116023. doi: 10.1109/ACCESS.2020.3003790.
[28] Koshchii, O. (2023). Activities of domestic organizations in the conditions of digitalization. *Economic Forum*, 13(4), 94-101. doi: 10.36910/6775-2308-8559-2023-4-12.
[29] Kovalchuk, V., Ruda, D.Ya., & Yaremchuk, D.Ya. (2018). Modern approaches to strategic personnel management in ensuring the competitiveness of the organization. *Economic Discourse*, 3, 135-140.
[30] Krishna, S.R., Rathor, K., Ranga, J., Soni, A., & Kumar, A. (2023). Artificial intelligence integrated with big data analytics for enhanced marketing. In *Proceedings of the international conference on inventive computation technologies* (pp. 1073-1077). Lalitpur: IEEE. doi: 10.1109/ICICT57646.2023.10134043.
[31] Lehenchuk, S., & Zavalii, T. (2023). Big data in marketing analytics: Opportunities and problems of use. *Problems of Theory and Methodology of Accounting, Control and Analysis*, 54(1), 52-58. doi: 10.26642/pbo-2023-1(54)-52-58.
[32] Liu, C., Peng, G., Kong, Y., Li, S., & Chen, S. (2021). Data quality affecting big data analytics in smart factories: Research themes, issues and methods. *Symmetry*, 13(8), article number 1440. doi: 10.3390/sym13081440.
[33] Maheshwari, S., Gautam, P., & Jaggi, C.K. (2021). Role of big data analytics in supply chain management: Current trends and future perspectives. *International Journal of Production Research*, 59(6), 1875-1900. doi: 10.1080/00207543.2020.1793011.
[34] Maloku, F., & Maloku, B. (2024). Analyzing IBM HR data: Employee attrition and performance insights. *Journal of Engineering and Applied Sciences Technology*, 6(8). doi: 10.47363/JEAST/2024(6)268.
[35] Marinakis, V., Doukas, H., Tsapelas, J., Mouzakitis, S., Sicilia, Á., Madrazo, L., & Sgouridis, S. (2020). From big data to smart energy services: An application for intelligent energy management. *Future Generation Computer Systems*, 110, 572-586. doi: 10.1016/j.future.2018.04.062.
[36] Mistry, M. (2025). *An in-depth predictive analytics guide to boost business growth with smarter, data-driven decisions*. Retrieved from https://kodytechnolab.com/blog/predictive-analytics-guide/.
[37] Nfise, M. (2025). *IBM HR analytics: Employee turnover analysis*. Retrieved from https://www.kaggle.com/code/miraclenifise/ibm-hr-analytics-employee-turnover-analysis.
[38] Nguyen, D.K., Sermpinis, G., & Stasinakis, C. (2023). Big data, artificial intelligence and machine learning: A transformative symbiosis in favour of financial technology. *European Financial Management*, 29(2), 517-548. doi: 10.1111/eufm.12365.
[39] Oyewole, A.T., Oguejiofor, B.B., Eneh, N.E., Akpuokwe, C.U., & Bakare, S.S. (2024). Data privacy laws and their impact on financial technology companies: A review. *Computer Science & IT Research Journal*, 5(3), 628-650. doi: 10.51594/csitrj.v5i3.911.
[40] Park, K.O. (2020). A study on sustainable usage intention of blockchain in the big data era: Logistics and supply chain management companies. *Sustainability*, 12(24), article number 10670. doi: 10.3390/su122410670.
[41] Raut, R.D., Mangla, S.K., Narwane, V.S., Gardas, B.B., Priyadarshinee, P., & Narkhede, B.E. (2019). Linking big data analytics and operational sustainability practices for sustainable business management. *Journal of Cleaner Production*, 224, 10-24. doi: 10.1016/j.jclepro.2019.03.181.
[42] Reddy, V.M., & Nalla, L.N. (2024). Personalization in e-commerce marketing: Leveraging big data for tailored consumer engagement. *Revista de Inteligencia Artificial en Medicina*, 15(1), 691-725.
[43] Ridzuan, F., & Wan Zainon, W.M. (2019). A review on data cleansing methods for big data. *Procedia Computer Science*, 161, 731-738. doi: 10.1016/j.procs.2019.11.177.

[44] Sen, P.C., Hajra, M., & Ghosh, M. (2020). Supervised classification algorithms in machine learning: A survey and review. In J. Kumar Mandal & D. Bhattacharya (Eds.), *Emerging technology in modelling and graphics: Proceedings of IEM graph 2018* (pp. 99-111). Singapore: Springer. doi: 10.1007/978-981-13-7403-6_11.

[45] Seyedan, M., & Mafakheri, F. (2020). Predictive big data analytics for supply chain demand forecasting: Methods, applications, and research opportunities. *Journal of Big Data*, 7(1), article number 53. doi: 10.1186/s40537-020-00329-2.

[46] Shetty, S.H., Shetty, S., Singh, C., & Rao, A. (2022). Supervised machine learning: Algorithms and applications. In P. Singh (Ed.), *Fundamentals and methods of machine and deep learning: Algorithms, tools and applications* (pp. 1-16). London: Scrivener Publishing LLC. doi: 10.1002/9781119821908.ch1.

[47] Sonica, B. (2025). *Case study: JP Morgan's AI risk assessment & fraud detection tools*. Retrieved from https://gamereviews.co.in/case-study-jp-morgans-ai-risk-assessment-fraud-detection-tools.

[48] Talwar, S., Kaur, P., Fosso Wamba, S., & Dhir, A. (2021). Big data in operations and supply chain management: A systematic literature review and future research agenda. *International Journal of Production Research*, 59(11), 3509-3534. doi: 10.1080/00207543.2020.1868599.

[49] Tambuskar, C. (2025). *Inside Uber's dynamic pricing system: A comprehensive case study*. Retrieved from https://www.linkedin.com/pulse/inside-ubers-dynamic-pricing-system-comprehensive-case-tambuskar-xtxef.

[50] Verma, A. (2024). *Use of data analytics by Uber to enhance supply efficiency and service quality*. Retrieved from https://www.pickl.ai/blog/use-of-data-analytics-by-uber-to-enhance-supply-efficiency-and-service-quality/.

[51] Yu, W., Dillon, T., Mostafa, F., Rahayu, W., & Liu, Y. (2019). A global manufacturing big data ecosystem for fault detection in predictive maintenance. *IEEE Transactions on Industrial Informatics*, 16(1), 183-192. doi: 10.1109/TII.2019.2915846.

[52] Zhang, Y., Xu, S., Zhang, L., & Yang, M. (2021). Big data and human resource management research: An integrative review and new directions for future research. *Journal of Business Research*, 133, 34-50. doi: 10.1016/j.jbusres.2021.04.019.

Вплив аналітики великих даних на ефективність управлінських рішень

Дмитро Зелений

Магістр

Київський національний економічний університет імені Вадима Гетьмана

3057, просп. Берестейський, 54/1, м. Київ, Україна

https://orcid.org/0009-0003-2719-6357

Анотація. Метою дослідження було оцінити вплив аналітики великих даних на якість управлінських рішень шляхом аналізу ключових технологій, методів обробки та інтерпретації даних у сучасному бізнес-середовищі. Методологія дослідження включала аналіз та порівняння існуючих підходів до використання аналітики великих даних у різних галузях, а також застосування методів кейс-стаді та моделювання для оцінки впливу Big Data на ефективність управлінських рішень в умовах нестабільного ресурсозабезпечення. Також у дослідженні було проаналізовано прикладне використання Big Data у фінансах, маркетингу, логістиці, виробництві, управлінні персоналом та державному управлінні з опорою на реальні кейси таких компаній, як Amazon, Uber, Walmart, General Electric та Netflix. Описано типи алгоритмів машинного навчання (класифікація, кластеризація, регресія, глибоке навчання), приклади їх застосування (сегментація клієнтів, прогноз попиту, виявлення аномалій) і їхній вплив на ефективність управлінських рішень. Зазначено ключові технології – Hadoop, Spark і Tableau, які забезпечують обробку, аналіз і візуалізацію великих даних. Акцент зроблено на перевагах Big Data – підвищення точності прогнозування, персоналізація, автоматизація, адаптація до ринку – та викликах впровадження, зокрема потребі в обчислювальних ресурсах, кваліфікованих кадрах і захисті даних, що є критичними для досягнення управлінської ефективності. Отримані результати дозволять підприємствам оптимізувати операційні процеси, підвищити ефективність використання ресурсів, а також адаптувати стратегічні рішення під специфічні умови ринку та технологічні виклики. Крім того, дослідження дає змогу вдосконалити інтеграцію аналітики великих даних з іншими цифровими технологіями, такими як BIM та IoT, що сприяє більш точному прогнозуванню та оптимізації бізнес-процесів. Практичне значення дослідження полягає у визначенні способів ефективного застосування аналітики великих даних для покращення управлінських рішень у різних галузях

Ключові слова: обробка інформації; прогнозування; алгоритмічні підходи; оптимізація процесів; штучний інтелект