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THE ROLE OF BIG DATA ANALYTICS IN KNOWLEDGE-BASED DECISION MAKING

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ABSTRACT

Big data analytics has emerged as an important tool for improving knowledge-based decision-making in modern organizations. The rapid growth of digital technologies, online platforms, business transactions, and information systems has created enormous amounts of structured and unstructured data. Organizations increasingly depend on analytical techniques to transform this information into meaningful knowledge that supports planning, problem-solving, innovation, and strategic development. Big data analytics combines advanced statistical methods, machine learning, artificial intelligence, data visualization, and predictive modelling to identify patterns, discover relationships, and generate insights from complex datasets. These capabilities enable managers, researchers, policymakers, and other decision-makers to make informed decisions based on evidence rather than relying exclusively on intuition or previous experience. This research examines the role of big data analytics in strengthening knowledge-based decision-making, with particular attention to organizational performance, knowledge management, decision accuracy, operational efficiency, and competitive advantage. It also considers important challenges associated with data quality, privacy, cybersecurity, analytical skills, and the responsible interpretation of analytical results. The study adopts a qualitative, literature-based approach to examine contemporary research and identify the ways in which analytical capabilities contribute to knowledge creation and practical decision-making. The discussion emphasizes that the value of big data analytics depends not only on the availability of large datasets but also on the ability of organizations to interpret information, integrate analytical findings with professional expertise, and translate knowledge into effective action.

KEYWORDS: *Big Data Analytics, Knowledge-Based Decision Making, Knowledge Management, Artificial Intelligence, Data-Driven Decisions, Organizational Performance, Predictive Analytics, Business Intelligence.*

INTRODUCTION

The development of digital technologies has transformed the way organizations collect, process, store, and interpret information. Businesses, educational institutions, healthcare organizations, government departments, and research institutions generate extensive amounts of data through digital transactions, customer interactions, electronic records, social media, and automated information systems. However, the availability of information does not automatically guarantee effective decision-making. Organizations must develop the ability to identify relevant information, interpret its meaning, and convert analytical results into useful knowledge. Big data analytics provides methods for processing large, diverse, and rapidly generated datasets to discover meaningful patterns and support evidence-based decisions. In this context, knowledge-based decision-making refers to the systematic use of reliable information, analytical insights, professional experience, and organizational knowledge to select appropriate actions and achieve specific objectives. Al-Alshare, F. A., Alsariera, E., Almagharbeh, B. K., Allahham, M. I., Al-Rawashdeh, R. N. A., & Alfawaerh, N. H. S. (2026). Found that.Big data analytics has become increasingly important because traditional decision-making methods may not be sufficient for handling the complexity and volume of contemporary information. Conventional analytical systems often focus on historical records, limited datasets, and descriptive summaries, whereas modern analytical technologies can examine multiple data sources and identify relationships that may otherwise remain

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unnoticed. Predictive analytics can estimate future trends, while prescriptive analytics can compare alternative actions and support the selection of suitable strategies.

These capabilities allow organizations to anticipate customer needs, recognize operational problems, allocate resources efficiently, and respond to changing environments. Nevertheless, analytical findings must be interpreted carefully because incomplete datasets, biased algorithms, and inappropriate assumptions can produce misleading conclusions. Effective decision-making therefore requires a combination of technological capabilities and human judgment.Knowledge management is another important dimension of the relationship between big data analytics and decision-making. Knowledge management involves the creation, organization, storage, sharing, and application of knowledge within an organization. Altaf, S., Shafique, I., Qammar, A., Waqas, M., & Tariq, A. (2026).explains. Big data analytics strengthens this process by identifying useful information within extensive datasets and presenting findings in forms that decision-makers can understand. For example, customer feedback can reveal changing preferences, educational data can help identify learning difficulties, and healthcare information can support the assessment of service needs. When analytical insights are integrated into organizational knowledge systems, employees can access relevant evidence more efficiently and use previous experiences alongside current information. This integration can improve institutional learning, encourage collaboration, and reduce dependence on isolated individual knowledge.

The increasing use of artificial intelligence and machine learning has further expanded the potential of big data analytics. These technologies can identify complex patterns, classify information, detect unusual activities, and generate predictions from historical and real-time data. Organizations can use such capabilities to improve demand forecasting, evaluate operational performance, monitor risks, and develop more personalized services. Analytical dashboards and visualization tools also make complex information easier to understand by presenting results through charts, indicators, and comparative summaries. However, the effectiveness of these technologies depends on the suitability of the data, the quality of analytical models, and the ability of decision-makers to understand their limitations. Atlas, F., Yitong, Y., & Khan, K. U. (2025). Explained.Technology should therefore support, rather than automatically replace, critical thinking and professional responsibility.Despite its potential benefits, the implementation of big data analytics presents several organizational and ethical challenges. Data may be incomplete, outdated, inconsistent, or collected from sources that do not adequately represent the population being studied. Privacy concerns arise when organizations collect and analyze personal information without appropriate safeguards, while cybersecurity threats can expose sensitive records to unauthorized access. Furthermore, organizations may experience difficulties because of limited budgets, inadequate technological infrastructure, insufficient employee training, and resistance to organizational change. The complexity of advanced analytical models can also make it difficult for managers to understand how recommendations are produced. Addressing these challenges requires appropriate data governance, transparent analytical procedures, clear accountability, and continuous development of employees' analytical competencies.

The role of big data analytics in knowledge-based decision-making is therefore broader than the technical processing of information. It involves establishing a systematic relationship between data collection, analytical interpretation, knowledge sharing, organizational learning, and practical action. Organizations must determine which data are relevant, select appropriate

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analytical methods, evaluate the reliability of findings, and communicate conclusions to the individuals responsible for making decisions. This study examines these interconnected processes by reviewing the relationship between big data analytics and decision quality, identifying its potential organizational benefits, and considering the conditions necessary for successful implementation. By exploring these dimensions, the research seeks to explain how data-driven knowledge can support more accurate, timely, transparent, and strategically informed decisions in contemporary organizations.

RESEARCH OBJECTIVES

1. To examine the role of big data analytics in improving knowledge-based decision-making and organizational performance.

RESEARCH QUESTIONS

1. How does big data analytics contribute to knowledge-based decision-making and improved organizational performance?

LITERATURE REVIEW

The relationship between big data analytics and knowledge-based decision-making has received increasing attention in contemporary research. Organizations are increasingly recognizing that data can create strategic value when it is converted into reliable knowledge and incorporated into managerial decisions. Bejjani and Vanhaverbeke (2025) examined big data decision-making capabilities through a systematic literature review and qualitative inquiry, identifying data and knowledge management, technology and information systems, and organizational factors as important dimensions. Their research suggests that successful analytical decision-making requires coordination between technological resources and organizational capabilities. The availability of sophisticated analytical tools alone is insufficient if employees cannot interpret findings or if organizations lack effective systems for sharing knowledge. Bejjani, Y., & Vanhaverbeke, W. (2025). Found that.This perspective establishes big data analytics as an organizational capability rather than simply a technical process. It also indicates that knowledge-based decisions depend on the integration of relevant data, analytical expertise, managerial understanding, and organizational objectives.A second important theme in the literature concerns the relationship between analytical capabilities and organizational performance. Research published in 2025 and 2026 increasingly examines how data-driven decision-making can improve operational planning, strategic management, and the identification of emerging opportunities.

Lagzi et al. (2026) reviewed data-driven decision-making practices using bibliometric and systematic review methods, highlighting the importance of machine learning, statistical models, qualitative methods, and other analytical approaches. Their findings indicate that decision-making research has developed across several fields, including operations and business management, while other areas continue to offer opportunities for further investigation. Big data analytics can help managers compare performance indicators, identify inefficiencies, and assess alternative strategies using evidence from multiple sources. Nevertheless, organizational performance depends on how analytical recommendations are applied in practice. Decisions must remain consistent with organizational goals, available

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resources, and the specific conditions in which the organization operates.Another significant area of research focuses on the role of knowledge-based resources in transforming analytical outputs into useful managerial decisions. Orjatsalo et al. (2026) examined knowledge-based resources in business analytics through a systematic review of academic literature. Their work emphasizes the importance of understanding how tangible resources, including data and technology, interact with intangible resources such as expertise, organizational knowledge, and analytical competencies. This relationship is important because organizations may possess substantial volumes of data but still struggle to make effective decisions if their employees lack the skills required to interpret results. Knowledge-sharing practices, employee experience, and collaboration between technical specialists and managers can help bridge this gap. Integrating analytical results with organizational knowledge can improve the relevance of recommendations and make it easier to apply lessons from previous decisions. Accordingly, the value of big data analytics depends on the combined strength of technological infrastructure and human knowledge.

The integration of artificial intelligence into data analytics has also attracted considerable attention. Machine learning and intelligent decision-support systems can process complex information, identify patterns, and generate predictions that support planning and risk assessment. Research by Choowan and Daovisan (2026) examines artificial intelligence in data governance for financial decision-making and highlights the relationship between governance maturity and effective AI-supported outcomes. Similarly, recent research on trustworthy artificial intelligence emphasizes the importance of evaluating the reliability, transparency, and accountability of systems throughout their operational life cycle. These developments demonstrate that advanced analytical systems can support decisions only when their outputs are appropriately governed and interpreted. For instance, an automated recommendation may identify a possible financial risk, but a qualified decision-maker must assess the context, verify the underlying assumptions, and determine an appropriate response. The literature therefore supports a balanced approach in which artificial intelligence strengthens human decision-making without eliminating professional oversight.Research has further emphasized the importance of governance, data quality, privacy, and accountability in analytical decision-making. Organizations frequently combine information from different databases, digital platforms, and operational systems, creating challenges related to consistency, accuracy, completeness, and security. Karamatzanis et al. (2025) investigated the use of big data analytics and technological tools in corporate governance through interviews with senior executives and board-level participants.

Their work highlights the relevance of analytical technologies to governance practices and the organizational barriers that may affect their adoption. Effective governance requires clearly defined responsibilities, suitable access controls, reliable data-management procedures, and mechanisms for reviewing analytical recommendations. Privacy protection is particularly important when data contains personal or confidential information. In addition, organizations must monitor possible algorithmic bias and ensure that analytical processes do not unfairly disadvantage particular individuals or groups. Choowan, P., & Daovisan, H. (2026). Found.These safeguards can strengthen trust in analytical systems and improve the legitimacy of knowledge-based decisions.Finally, the recent literature identifies important opportunities for integrating big data analytics with organizational learning and future decision-support systems. Basile et al. (2025) examined the use of data to support decision-making in healthcare and identified directions for further research, demonstrating the

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importance of data exploitation across complex service environments. Bejjani and Vanhaverbeke (2025) similarly emphasize the need to develop organizational capabilities that connect data management, technology, and organizational practices. Together, these research directions suggest that effective decision-making requires continuous evaluation rather than one-time adoption of analytical tools. Organizations need to assess whether their models remain accurate, whether employees understand the resulting recommendations, and whether decisions produce the intended outcomes. A significant opportunity for future research is to investigate how knowledge-sharing cultures, employee training, transparent AI systems, and strong governance frameworks interact to influence decision quality across different sectors. This study builds on these themes by considering big data analytics as a combined technological, organizational, and knowledge-management capability.

METHODOLOGY

This study adopts a qualitative, literature-based methodology to examine the role of big data analytics in knowledge-based decision-making. The approach is appropriate because the research aims to understand concepts, identify recurring themes, and explain relationships between analytical technologies, organizational knowledge, and decision-making practices rather than measure the performance of a single algorithm. The study draws on contemporary scholarly literature published in 2025 and 2026, focusing on research related to big data analytics, data-driven decision-making, knowledge management, artificial intelligence, business analytics, and data governance. Relevant publications are considered in terms of their connection to the research questions and their contribution to understanding analytical decision-making. The methodology provides a structured basis for examining how organizations transform large datasets into actionable knowledge and how this process influences decision quality.The literature identification process focuses on academic publications accessible through scholarly search platforms, journal websites, and research databases. Search terms include “big data analytics,” “knowledge-based decision-making,” “data-driven decision-making,” “business analytics capabilities,” “knowledge management,” and “artificial intelligence decision support.” Combinations of these terms help identify research addressing the relationship between analytical technologies and organizational decisions.Priority is given to peer-reviewed journal articles and systematic literature reviews published in 2025 or 2026. Studies that discuss data processing without a meaningful connection to knowledge creation or decision-making are considered less directly relevant. This selection strategy helps maintain a clear relationship between the reviewed literature and the objectives of the study.The methodological process involves examining the purpose, approach, findings, and implications of the selected publications. Each relevant study is considered according to its contribution to understanding analytical capabilities, knowledge integration, organizational performance, governance, and implementation challenges.

RESEARCH DESIGN

The research uses a qualitative descriptive and literature-review design. It is designed to organize contemporary academic evidence into a clear explanation of how big data analytics contributes to knowledge-based decision-making. The design does not involve manipulation of variables or the testing of a controlled experimental hypothesis. Instead, it examines existing studies to identify the principal mechanisms, benefits, and challenges associated with analytical decision-support practices. This design is appropriate for a topic that spans several

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disciplines, including information systems, management, data science, and organizational knowledge management.The design begins by defining the central concepts and establishing the scope of the literature review. Big data analytics is considered in relation to the collection, processing, analysis, and interpretation of large datasets, while knowledge-based decision-making is understood as the application of evidence, analytical insights, and professional expertise to the selection of actions. Relevant publications from 2025 and 2026 are then considered in relation to these concepts. The scope emphasizes studies that explain how analytics supports decisions, how knowledge resources influence its effectiveness, and how governance conditions affect responsible implementation.The next stage involves organizing the reviewed evidence into thematic categories. These categories include technological capabilities, decision quality, organizational learning, predictive analytics, resource allocation, privacy, and accountability. The design permits findings from different studies to be compared while preserving their original context and methodological limitations. For example, evidence from a financial governance study is not automatically treated as proof that identical results will occur in education or healthcare. Instead, cross-sector similarities are interpreted as potential common principles that require further validation in particular organizational environments.The final stage integrates the thematic findings into a conceptual explanation of effective analytical decision-making. The design considers the relationship between reliable data, suitable analytical methods, knowledge-sharing practices, human judgment, and organizational outcomes. It also identifies conditions that may weaken the usefulness of analytical systems, including poor-quality information, inadequate expertise, limited transparency, and insufficient governance.

DATA ANALYSIS

The thematic analysis indicates that big data analytics can improve knowledge-based decision-making by transforming large volumes of raw information into organized, interpretable, and actionable insights. The first major theme is decision quality and analytical accuracy. Statistical analysis, predictive modelling, and machine learning can help decision-makers identify patterns, compare alternatives, and evaluate potential outcomes before selecting a course of action. Altaf et al. (2026) examined analytics-enabled dynamic capabilities and decision-making quality in software firms in Pakistan, highlighting the role of organizational learning in this relationship. This evidence suggests that analytical capabilities are most useful when organizations can translate model outputs into appropriate decisions. However, improved analytical accuracy should not be confused with guaranteed decision success, because outcomes also depend on data quality, assumptions, and the conditions in which decisions are implemented.The second theme concerns knowledge management and organizational learning. Big data analytics can help organizations create knowledge by combining information from different sources and identifying relationships that may not be apparent through conventional reporting. Kampoowale (2026) examined the connections between big data analytics capabilities, knowledge management, data-driven decision-making, and organizational learning. The findings indicate that knowledge management and data-driven decision-making can help explain how analytics capabilities contribute to organizational learning. From a practical perspective, analytical results become more valuable when employees share their interpretations, document previous decisions, and use new evidence to improve existing practices. Knowledge-sharing systems, collaborative analytical teams, and accessible reporting tools can therefore strengthen the connection between data analysis and organizational knowledge.The third theme relates to organizational

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performance, strategic planning, and operational efficiency. Big data analytics enables organizations to monitor performance indicators, identify inefficiencies, anticipate demand, and evaluate possible risks.

FINDINGS

The first major finding is that big data analytics can strengthen knowledge-based decision-making by providing decision-makers with more comprehensive and timely information. Organizations can use analytical systems to identify patterns, examine historical performance, compare alternatives, and assess potential risks. These capabilities can reduce dependence on incomplete information and unsupported assumptions. When analytical results are relevant to the decision being considered, managers can develop a clearer understanding of the available options and their possible consequences. However, analytics should be regarded as a source of decision support rather than an automatic guarantee of accuracy. The reliability of the final decision continues to depend on the quality of the evidence, the competence of decision-makers, and the context in which the information is used.The second finding is that knowledge management plays an important role in converting analytical outputs into practical organizational knowledge. The literature indicates that organizations benefit when analytical findings are documented, shared, interpreted, and incorporated into routine activities. Kampoowale (2026) identifies knowledge management and data-driven decision-making as relevant mechanisms connecting big data analytics capabilities with organizational learning. This relationship suggests that technology becomes more useful when employees can learn from analytical results and apply those lessons to future situations. Organizations should therefore develop knowledge-sharing practices that connect data specialists, managers, and operational employees. Such collaboration can help ensure that technical insights are interpreted appropriately and used to improve organizational processes.The third finding is that big data analytics can contribute to strategic planning, innovation, and organizational performance. Predictive models and analytical dashboards can help organizations recognize emerging trends, evaluate performance, forecast demand, and identify opportunities for improvement.

CONCLUSION

Big data analytics has become an important capability for organizations seeking to improve knowledge-based decision-making in increasingly complex and information-intensive environments. By processing large datasets and identifying meaningful patterns, analytical systems can provide decision-makers with evidence that supports planning, problem-solving, risk assessment, and strategic development. This study examined the relationship between big data analytics, knowledge management, organizational learning, decision quality, and responsible governance through a qualitative review of contemporary research published in 2025 and 2026. The overall analysis indicates that analytics can strengthen decision-making by improving access to relevant information, supporting the comparison of alternatives, and helping organizations anticipate potential developments. However, the value of these capabilities depends on how effectively analytical findings are interpreted and applied in practice.The study also concludes that knowledge management is a central element in the relationship between data analytics and organizational effectiveness. Data becomes useful knowledge when organizations can interpret findings, share insights, connect new information with existing expertise, and incorporate lessons into future decisions. Employees

and managers must therefore work collaboratively to ensure that analytical recommendations are understandable and relevant to organizational objectives. Knowledge-sharing systems, continuous training, and the documentation of previous decisions can help organizations retain valuable experience and improve institutional learning. Consequently, investment in analytical technology should be accompanied by investment in the human and organizational capabilities required to use it effectively.Another important conclusion concerns the role of big data analytics in strategic planning and organizational performance. Analytical methods can help organizations recognize emerging trends, allocate resources more efficiently, monitor operational results, and identify opportunities for innovation.

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