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AI AND MANAGERIAL DECISION-MAKING: OPPORTUNITIES, CHALLENGES, AND IMPLICATIONS FROM PREVIOUS STUDIES

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ABSTRACT

In the digital era, artificial intelligence (AI) is developing rapidly and becoming deeply integrated into managerial functions, thereby reshaping the quality of decision-making through its superior data-processing capabilities. This study examines the impact of AI on managerial decision-making processes and systematizes the core conceptual foundations, thereby providing a comprehensive view of the current state of AI application in supporting organizational management. Using a qualitative research approach, the study synthesizes and analyzes the opportunities offered by AI, including the optimization of data-processing speed, the enhancement of accuracy, and improved risk prediction. However, the paper also highlights the challenges and potential risks associated with AI adoption, particularly issues related to algorithmic ethics, lack of transparency, and excessive human dependence on technology. The findings indicate that optimal managerial effectiveness can only be achieved through a balanced integration of artificial intelligence, professional judgment, and rigorous managerial oversight. Finally, the study proposes practical managerial implications for individuals and organizations, while also suggesting directions for future research.

Keyword: AI, managerial decision-making, human-AI collaboration

1. INTRODUCTION

In the era of digital transformation, artificial intelligence (AI) has emerged as a pivotal force that is deeply embedded in core managerial functions and is reshaping organizational decision-making across diverse sectors such as healthcare, law, business, education, and tourism (Albashrawi, 2025; Wang, 2025). In the highly competitive and increasingly complex business environment, the quality of decision-making is not only vital to organizational survival but also directly influences managers' career trajectories, thereby requiring organizations to make timely and well-grounded decisions (Bagchi & Sharma, 2026; Guthrie et al., 2025). Empirical evidence has demonstrated that AI can significantly enhance decision-making performance, particularly by optimizing the speed of decision-making (Guthrie et al., 2025). Nevertheless, managers today must process massive volumes of data under considerable time pressure, while traditional decision-making models based primarily on personal experience are gradually revealing limitations in processing efficiency (Alves et al., 2024). At present, a substantial gap still exists between the complexity of real-world managerial problems and the processing capabilities of current AI tools (Bagchi & Sharma, 2026). Furthermore, concerns regarding privacy, ethical barriers, the lack of human empathy, and ongoing debates over transparency and the role of humans in collaborative models remain insufficiently resolved (Alves et al., 2024; Wang, 2025).

Although numerous studies have examined AI in decision-making, existing approaches remain fragmented, ranging from viewing AI as a tool for data analysis and decision support to algorithmic decision-making (ADM) and human–machine collaboration (Guthrie et al., 2025; Alves et al., 2024; Wang, 2025; Leitão et al., 2022). Such fragmentation has led to the absence of a comprehensive understanding of AI's actual impact on managerial activities. Therefore, systematizing prior studies has become an urgent necessity in order to clarify how AI has been examined, as well as to identify both the opportunities it offers and the challenges that remain unresolved. On this basis, the present paper focuses on synthesizing theoretical perspectives and empirical evidence from an organizational viewpoint, approaching AI as a strategic factor for performance optimization

rather than delving into purely technical aspects. This synthesis not only enables the formulation of practical managerial implications but also identifies important research gaps for future investigation.

2. CONCEPTUAL FOUNDATIONS OF AI AND MANAGERIAL DECISION-MAKING

2.1. The Concept of AI

According to Russell and Norvig (2020), AI is not merely concerned with simulating human cognitive capabilities such as learning and reasoning, but is also designed as a rational agent, that is, a system capable of rational thinking leading to rational action, perceiving its environment, and performing optimal actions to achieve goals in complex tasks. From the perspective of computer science and cognitive theory, McCarthy et al. (1955) viewed AI not as a single technology but as a combination of algorithms and computational capabilities. In recent studies, AI has been described as a system capable of addressing complex problems in order to bridge the gap between available data and the still-limited cognitive capacity of humans (Bagchi & Sharma, 2026).

In management research, AI is often implemented and discussed through different dimensions. Alves et al. (2024) referred to AI in the form of machine learning (ML), which is used to identify highly complex patterns from large volumes of data. Guthrie et al. (2025) highlighted the predictive analytics capability of AI, which relies on historical data to forecast trends and outcomes, thereby contributing to improved decision quality and the recommendation of optimal courses of action. AI in the form of expert systems has also been applied through the codification of expert knowledge in various fields into rule-based systems to support decision-making.

Thus, AI can be understood as a technology that simulates human thought processes and intelligent behavior in machines, particularly computer systems. Rather than merely executing pre-programmed commands, AI is capable of processing data autonomously, learning from experience, and making decisions or predictions in order to solve specific problems in an intelligent manner.

2.2. The Concept of Managerial Decision-Making

Managerial decision-making is defined as a systematic process of identifying and resolving organizational problems through the analysis and selection of the most appropriate course of action (Simon, 1960). It is regarded as the most important and distinctive responsibility of managers, as the quality of managerial decisions not only shapes organizational success but also directly affects managers' own career trajectories (Bagchi & Sharma, 2026). Within the management system, decisions can be classified according to their level of influence and scope of impact. Specifically, managerial decisions are commonly categorized into three levels: (1) strategic decisions, which are long-term in nature and determine the survival and development of the organization; (2) tactical decisions, which translate organizational objectives into functional or departmental plans; and (3) operational decisions, which address routine day-to-day management and operational issues (Anthony, 1965; Mackay & Zundel, 2017; Mintzberg, 1973).

In summary, managerial decision-making can be understood as a systematic process through which organizational problems are identified and addressed by selecting the most appropriate alternative. It represents a core managerial function that determines both organizational performance and the professional success of managers. Based on the level of influence and scope of impact, managerial decisions may be classified into three categories: strategic, tactical, and operational.

2.3. The Managerial Decision-Making Process

The managerial decision-making process is a systematic sequence of cognitive and analytical activities that plays a central role in organizational management. This process begins with problem identification, in which managers are required to recognize and analyze the nature of the issue in order to classify it as structured, semi-structured, or unstructured (Simon, 1960). This is followed by information collection and processing, a crucial stage that provides a reliable and objective data foundation for subsequent analysis (Gorry & Scott Morton, 1971). On this basis, the stages of alternative generation and evaluation are undertaken. This phase requires a combination of analytical techniques and the manager's personal

judgment to compare the benefits, risks, and feasibility of each alternative (Simon, 1960). After selecting the optimal alternative, or the one that best satisfies the intended objectives, managers proceed to decision implementation in practice, followed by monitoring and adjustment. This feedback loop enables managers to assess actual outcomes against initial expectations, thereby making timely adjustments and fostering organizational learning to adapt to changes in the business environment in subsequent decision cycles (Gorry & Scott Morton, 1971).

In summary, the managerial decision-making process is a systematic sequence of activities that begins with identifying and classifying the nature of the problem. Managers then collect and process information as the basis for generating and evaluating alternatives through a combination of analytical techniques and personal judgment. After selecting and implementing the most appropriate alternative, the final stage involves monitoring and adjustment. This feedback loop helps assess actual effectiveness, allows timely refinement, and promotes organizational learning in response to environmental changes.

2.4. The Relationship Between AI and Managerial Decision-Making

In the contemporary management context, the relationship between AI and managerial decision-making extends beyond the mere automation of analysis and routine task processing, gradually evolving toward a model of strategic collaboration between humans and AI, commonly referred to as Human–AI Collaboration (HAIC). Leitão et al. (2022) emphasized that machines simulate computational and learning capabilities in order to collaborate with humans throughout the decision-making process. AI is capable of being deeply involved in nearly all stages of this process, from problem identification, through the detection of anomalies in large-scale data, to data analysis and trend forecasting, thereby reducing environmental uncertainty (Guthrie et al., 2025). In more complex situations, AI plays an important role in generating alternatives and evaluating scenarios, allowing managers to simulate potential outcomes before implementation, while also supporting real-time performance monitoring to enable timely adjustments (Bagchi & Sharma, 2026). However, existing empirical evidence also emphasizes that AI is primarily regarded as a tool for cognitive support and decision enhancement rather than a complete substitute for the managerial role (Albashrawi, 2025). According to Wang (2025), the effectiveness of algorithmic decision-making (ADM) depends on the alignment of four key elements: algorithmic characteristics, task nature, human capabilities, and organizational context. These relationships are further mediated by factors such as perceived fairness, trust in algorithms, ambiguity and role conflict, interpretive labor, and reductionism, while being conditioned by the interaction between humans and algorithms as well as by the legal and regulatory environment.

2.5. The Effectiveness of Managerial Decision-Making

The effectiveness of managerial decision-making is a multidimensional concept that reflects an organization's capacity to transform information and data resources into valuable strategic actions. This effectiveness is defined and assessed through a set of core operational criteria, including response speed, decision accuracy, and timeliness in seizing opportunities or mitigating risks. In addition, recent studies have emphasized rational resource allocation, risk prediction capability, and the degree of alignment with organizational objectives as critical indicators for ensuring consistency between managerial decisions and long-term business strategy (Guthrie et al., 2025; Bagchi & Sharma, 2026).

In summary, managerial decision-making is a systematic process through which organizational problems are identified and resolved by selecting the most appropriate course of action. It is also a core managerial function that determines organizational success and the professional credibility of managers, while being clearly differentiated across decision levels. The effectiveness of this process is inherently multidimensional, reflecting the ability to convert data into valuable action on the basis of speed, accuracy, timeliness, and resource optimization, thereby ensuring strong alignment with the strategic objectives of the organization.

3. CURRENT STATE OF RESEARCH ON AI IN SUPPORTING MANAGERIAL DECISION-MAKING

Research on AI in the field of management has gradually shifted from traditional expert systems to advanced learning models with high adaptive capacity. According to Albashrawi (2025), the

rapid emergence of generative AI (GenAI) has not only expanded the scope of AI applications across diverse sectors such as healthcare, law, business, education, and tourism, but has also reshaped the focus of management by moving beyond raw data processing toward more accurate forecasting and large-scale personalization. However, alongside this potential, the current research landscape continues to reveal inconsistencies in both the practical implementation and ethical implications of AI. Wang (2025) identified a critical issue in the application of algorithmic decision-making (ADM), namely the existence of tensions between the goal of optimizing operational efficiency and the need to preserve the core ethical values of organizations. This tension becomes even more complex when considered in light of the actual capabilities of modern AI tools. Despite considerable expectations surrounding large language models (LLMs), Bagchi and Sharma (2026) argued that a substantial gap still exists between the complexity of real-world managerial problems and the support capacity of current technologies. This lack of specific guidance and safe implementation pathways has left many managers uncertain and unable to fully leverage the power of AI in a sustainable and responsible manner.

Current research approaches can be broadly classified into two main streams, reflecting the multidimensional nature of AI application in organizations. The first stream focuses on AI as a tool for performance optimization and strategic decision-making in the empirical context of specific industries. Within this line of inquiry, Guthrie et al. (2025) emphasized how AI capabilities improve decision quality through the processing of massive volumes of data, while Alves et al. (2024) proposed replacing fragmented tools with more comprehensive management solutions. This potential has been clearly demonstrated in the healthcare sector, where AI supports clinical diagnosis and the coordination of patient care (Alves et al., 2024; Albashrawi, 2025). In addition, Bagchi and Sharma (2026) contributed a decision canvas model to help structure managerial thinking, alongside studies on resource optimization and sustainable operations in the logistics sector (Huang et al., 2024; Pournader et al., 2021; Zhou et al., 2024). Furthermore, the capabilities of GenAI have been extended to finance and marketing, where they are used for investment advisory, risk assessment, and customer behavior forecasting on a large data scale (Albashrawi, 2025).

The second stream examines Human–AI Collaboration (HAIC) together with issues of ethics and transparency in managerial decision-making. This stream is guided by the Learning to Defer (L2D) framework proposed by Leitão et al. (2022), which seeks to clarify the mechanism through which decision authority is transferred between machines and humans, thereby laying the foundation for subsequent studies on how algorithms reshape users' trust and perceptions of authority. At the same time, in order to address ethical tensions, this body of research also emphasizes bias mitigation, enhanced accountability, and the development of user trust in algorithmically generated decisions (Noponen et al., 2024; Albashrawi, 2025; Wang, 2025).

Previous studies have reached a considerable degree of consensus regarding the core benefits that AI brings to managerial decision-making. First, AI enhances data-processing capability by integrating fragmented data sources into meaningful information systems that directly support decision-making processes (Albashrawi, 2025). This benefit is not merely technical but can also be transformed into a strategic advantage. A longitudinal study by Guthrie et al. (2025) confirmed that AI significantly increases decision-making speed, thereby generating a substantial competitive advantage in volatile business environments. In addition, AI reduces managers' burden in relation to repetitive tasks. By automating structured decisions, AI enables human actors to devote their cognitive resources to more complex issues that require higher-order strategic thinking (Alves et al., 2024). Notably, the emergence of large language models (LLMs) has created new possibilities for simultaneously simulating and evaluating multiple complex scenarios, thereby allowing leaders to obtain a more comprehensive view before implementing strategic options (Bagchi & Sharma, 2026). Nevertheless, the effectiveness of AI is not independent. Its success is closely contingent upon several foundational mediating factors, including input data quality, the internal digital capabilities of the organization, and, most importantly, managerial readiness to accept and use AI (Guthrie et al., 2025; Wang, 2025).

Despite notable progress, the current research landscape on AI in management still reveals

fragmentation and several unresolved theoretical gaps. First, a major challenge lies in standardizing measures of AI effectiveness in decision-making processes, as existing studies still rely largely on managers' subjective perceptions rather than objective and clearly quantifiable indicators. Second, the boundary between AI as a support tool and AI as a full substitute for human decision-makers remains unclear, generating uncertainty regarding legal responsibility and ethical standards when errors occur. Third, a serious imbalance persists in the literature, as scholars have devoted disproportionate attention to technical and algorithmic issues, while core managerial dimensions such as organizational culture and behavioral psychology remain underexplored. Fourth, there is a shortage of empirical evidence from developing-country contexts, where digital infrastructure and managerial characteristics differ significantly from those of developed economies; this shortfall creates a noteworthy data gap. Finally, the mechanisms through which trust is built and system control is maintained remain highly contested issues. As algorithms become increasingly complex and less explainable, the question of how managers can genuinely control and trust AI-generated decisions remains unresolved**.**

4. OPPORTUNITIES OF AI FOR ENHANCING MANAGERIAL DECISION-MAKING EFFECTIVENESS

The rapid expansion and widespread diffusion of AI across multiple sectors have opened new pathways for optimizing managerial performance. Although important tool-related gaps and unresolved tensions remain in the literature, AI has consistently demonstrated its potential to enhance performance through digital capabilities across a wide range of contexts.

Enhancing data-processing capability. AI plays a pivotal role in extending the informational processing capacity of organizations. AI systems enhance managerial capability by providing real-time analyses based on actual data, thereby reducing human error and subjective bias (Hasan et al., 2023; Mikalef et al., 2020). As AI technologies continue to advance, sophisticated algorithms enable organizations to process both structured and unstructured data simultaneously with greater speed and accuracy, making it possible to identify patterns, trends, and complex relationships that would be difficult for human cognitive capacity alone to detect.

Accelerating decision-making speed. Decision-making speed refers to the time managers require to analyze information, evaluate alternatives, and make decisions that influence strategic outcomes (Chen et al., 2022). Speed represents one of the most visible benefits that AI brings to managerial processes. AI systems support data-driven decision-making by generating insights that go far beyond human processing capacity, thereby improving both the accuracy and speed of strategic choices (Davenport & Ronanki, 2018). By reducing the time devoted to manual analysis, AI enables managers to respond more flexibly and rapidly to continuous changes in markets and business environments. This advantage is particularly valuable in urgent contexts or in situations where input data change constantly and immediate responses are required.

Improving the quality of strategic and operational decisions. According to Bagchi and Sharma (2026), clearly identifying the nature of a decision, whether it relates to competition, business model enhancement, or governance, enables managers to apply appropriate solution frameworks in order to ensure decision quality. At the strategic level, AI strengthens the ability to analyze the macro environment, identify market opportunities, and assess risks more objectively through the processing of massive datasets (Guthrie et al., 2025). The integration of large language models (LLMs) into decision frameworks also helps structure complex strategic issues, allowing organizations to formulate long-term roadmaps based on data-driven evidence rather than relying solely on intuition (Bagchi & Sharma, 2026). At the operational level, AI translates strategic goals into concrete actions. Algorithmic decision-making (ADM) systems support the optimal allocation of resources, ranging from human resources to financial capital, in order to achieve the highest level of performance (Wang, 2025).

In conclusion, existing studies suggest that AI offers substantial opportunities to improve managerial decision-making by enhancing data-processing capability, accelerating decision speed, and strengthening the quality of both strategic and operational decisions. These advantages indicate that AI is not merely a technological tool but an increasingly important strategic resource for

organizations seeking to improve managerial effectiveness in a complex and dynamic environment. Nevertheless, the successful realization of these benefits depends on the organization's ability to integrate AI with managerial judgment, appropriate governance mechanisms, and context-specific strategic objectives.

5. CHALLENGES AND RISKS IN APPLYING AI TO MANAGERIAL DECISION-MAKING

Although AI offers breakthrough opportunities for optimizing managerial effectiveness, its implementation simultaneously gives rise to complex challenges and risks. Identifying these risks is therefore a strategic prerequisite for ensuring organizational stability.

Overreliance on AI. The growing dependence on AI in decision-making poses significant challenges regarding the impact of such technologies on managerial capability and actual management effectiveness. When managers rely excessively on algorithmic recommendations, they may gradually lose their critical thinking and independent analytical capacity in dealing with complex issues (Guthrie et al., 2025). This risk becomes particularly serious in areas that directly affect human rights and health safety. Alves et al. (2024) emphasized that the integration of AI into clinical systems creates the danger of delegating decisions to machines without rigorous human verification. Therefore, maintaining a balance between the use of AI as a support tool and preserving ultimate human control is essential for ensuring safety and effectiveness in contemporary management.

Lack of trust and managerial acceptance. Trust in AI is closely dependent on system performance and accuracy (Wang, 2025). However, a unique aspect of managerial psychology lies in the differing expectations regarding response time. Whereas prolonged human deliberation is often perceived as a sign of effort and careful consideration, delayed AI responses may reduce trust because users tend to assume that computational and predictive tasks should be performed instantaneously (Efendić et al., 2020). Doubts concerning the appropriateness or transparency of AI-generated recommendations create psychological barriers, making managers hesitant to delegate decision authority to technology. Consequently, building trust requires not only technical improvement but also a reconciliation between expectations of machine speed and the quality of judgment demanded by managers.

Limitations in digital capability and organizational resources. The successful implementation of algorithmic decision-making (ADM) systems depends heavily on the resources available within the organization, as these constitute the foundation for managing the relationship between technology and managerial effectiveness (Alves et al., 2024). However, one of the most significant current barriers is the severe shortage of personnel with AI expertise, which creates a gap between technological potential and practical implementation capacity. In addition, the costs of investment, integration, and system maintenance represent a considerable financial challenge for many organizations. Thus, the success of AI in management does not depend solely on the quality of algorithms, but also on the organization's ability to balance performance gains with cost considerations, technological infrastructure, and strict compliance with security requirements.

Ethical, legal, and security risks. Alves et al. (2024) highlighted privacy violation as one of the most critical challenges associated with AI adoption. In the managerial context, the absence of a clear mechanism for distinguishing between system failure and human operator error creates a gap in accountability. Moreover, the rapid development of AI technology has outpaced the ability of existing legal frameworks to regulate it effectively. This situation requires organizations to establish internal self-governance mechanisms and ethical control systems before formal regulatory frameworks are fully developed.

In conclusion, while AI has substantial potential to enhance managerial decision-making, its adoption is accompanied by major risks related to overreliance, trust, organizational readiness, and ethical, legal, and security concerns. These challenges suggest that the effectiveness of AI in management cannot be assessed solely in terms of technological capability, but must also be evaluated in relation to human oversight, institutional preparedness, and responsible governance.

6. CONCLUSIONS, MANAGERIAL IMPLICATIONS, AND FUTURE RESEARCH DIRECTIONS

Through the synthesis of prior studies and a detailed analysis of the current state and implications of AI for managerial decision-making, it can be affirmed that AI is no longer merely a technological option but has become an indispensable strategic factor in the operational architecture of modern organizations and businesses. In order to translate these research findings into practical value, this paper proposes several managerial implications for individual managers and business organizations in applying AI to decision-making processes. At the same time, the paper also acknowledges its existing limitations and suggests several promising directions for future research.

Implications for managers. Managers should view AI primarily as a support tool rather than allowing it to fully replace their role. Final decisions should be based on the integration of AI-generated recommendations, strategic judgment, and personal experience. This approach helps preserve ethical considerations and the human dimension in sensitive decisions that require fairness and contextual understanding. In addition, managers need to proactively strengthen their digital capabilities so as to develop a deeper understanding of data and the underlying logic of AI systems. Such competence is essential for assessing the accuracy, transparency, and validity of AI-generated outputs and for critically evaluating the recommendations provided by these systems.

Implications for AI risk governance and ethics. Businesses and governments should consider establishing dedicated governance frameworks to monitor and evaluate AI-generated outcomes. This is particularly important in the case of generative AI (GenAI), where controlling both inputs and outputs is of utmost importance in order to prevent the risks of misinformation and the amplification of biases embedded in training data. Findings from prior studies also emphasize that only when managers understand the basis of a decision can they fully exercise accountability afterward. This ensures that final decisions are not only technically transparent and accurate but also aligned with individual and organizational ethical standards.

Implications for human–AI collaboration. Organizations need to clearly define the supportive boundaries of AI according to the nature of each type of decision. Highly structured decisions based on historical data and requiring high processing speed are more suitable for extensive AI support. Rather than allowing AI to operate in a fully autonomous manner, organizations should promote and maintain a human-in-the-loop (HITL) model, in which humans function as a critical control point throughout the entire process. This model helps ensure that combined human–AI systems achieve higher levels of performance and fairness than AI operating independently. Ultimately, managers must retain their role as critical evaluators and final decision-makers with respect to AI-generated recommendations.

Limitations and future research directions. Although this paper has provided an overview of AI implementation in management, several limitations remain, thereby opening up potential avenues for future research. First, future studies should examine more deeply the psychological factors and managerial acceptance associated with AI adoption. Second, rather than relying on broad and generalized approaches, future research should develop more specialized investigations into specific types of AI, such as GenAI and predictive AI. This would enable managers to better classify and select AI solutions that are most compatible with the decision-making requirements of particular domains, such as strategic planning, financial management, human resource management, logistics optimization, or the personalization of customer experience in marketing. Narrowing the gap between technological capability and the operational realities of different industries will be a key condition for realizing the full potential of AI in contemporary management.

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