MODERNIZING MANAGERIAL DECISION-MAKING MECHANISMS THROUGH ARTIFICIAL INTELLIGENCE TECHNOLOGIES

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Abstract

This article examines the modernization of managerial decision-making mechanisms through artificial intelligence technologies. In the contemporary digital economy, managerial decisions must be made faster, with greater analytical depth, under higher uncertainty, and with stronger pressure for strategic adaptability. Artificial intelligence has emerged as a powerful instrument for transforming traditional decision-making mechanisms by improving data processing, forecasting, scenario modeling, risk assessment, and operational optimization. However, the effectiveness of AI in management does not depend solely on technological adoption; it also depends on governance quality, data maturity, human competencies, organizational readiness, and ethical control. Using a qualitative review-based methodology, this article synthesizes recent academic and institutional literature on digital transformation, AI adoption, and business management. The study identifies the main stages through which AI modernizes managerial decision-making, highlights its advantages and risks, and proposes an integrated framework for implementation. The findings show that AI-based decision-making mechanisms can improve strategic planning, financial control, market responsiveness, and organizational learning, provided they are embedded into broader digital transformation processes. The article concludes that AI should be understood not as a substitute for managerial judgment, but as a means of strengthening the speed, accuracy, consistency, and adaptability of managerial

decisions.

Key words: artificial intelligence, managerial decision-making, digital transformation, decision support systems, AI governance, predictive analytics, business management, organizational adaptability

Introduction

Managerial decision-making has always been central to organizational performance. Yet under conditions of digital transformation, the nature of management decisions has changed significantly. Managers are now required to respond to volatile markets, large flows of real-time data, complex customer behavior, faster innovation cycles, and increasing uncertainty. In such an environment, traditional decision-making mechanisms based on periodic reports, manual analysis, and intuition alone often become insufficient. Artificial intelligence technologies offer new possibilities for strengthening decision-making through advanced analytics, pattern recognition, forecasting, and automated recommendations.

The rapid spread of AI in firms confirms the practical relevance of this issue. OECD evidence shows that the share of firms using AI in OECD countries continued to rise sharply, reaching 20.2% in 2025, compared with 14.2% in 2024 and 8.7% in 2023. OECD materials further note that AI can support productivity, efficiency, and operational improvement, although adoption remains uneven across sectors and especially between large firms and smaller enterprises. This means that AI is increasingly entering the core of managerial practice, but its diffusion still depends on readiness conditions.

At the same time, international organizations emphasize that AI value depends on stronger foundations. The World Bank's 2025 report on AI foundations and UNCTAD's 2025 report on inclusive artificial intelligence both stress that AI benefits are shaped by data infrastructure, skills, institutional capacity, and

governance arrangements. Therefore, the modernization of managerial decision-making cannot be reduced to the purchase of AI tools; it requires a reconfiguration of decision processes themselves.

The purpose of this article is to analyze how managerial decision-making mechanisms can be modernized through artificial intelligence technologies. The study focuses on the conceptual foundations of AI-enabled decision-making, identifies the main mechanisms of transformation, and proposes a practical framework for implementation in managerial systems.

Literature Review

The theoretical basis for this topic begins with the broader literature on digital transformation. Vial (2019) argues that digital transformation is a process in which digital technologies trigger significant changes in value creation, structures, and strategic responses. This perspective is essential because it shows that AI should be understood as part of a larger managerial transformation rather than as a stand-alone technical instrument.

A second important theoretical perspective is the dynamic capabilities approach. Warner and Wager (2019) and Ellström et al. (2021) emphasize that organizations succeed in digital transformation when they can sense environmental change, seize new opportunities, and reconfigure internal resources. This approach is highly relevant to decision-making because decision quality in digital environments depends on the organization’s capacity to interpret signals, evaluate options quickly, and revise actions continuously.

Recent OECD studies bring the AI dimension directly into this discussion. OECD publications report that AI adoption in firms can improve labor productivity, efficiency, and business processes, but they also show that adoption remains incomplete and often concentrated in larger firms. For SMEs, AI adoption rose from 5.6% in 2020 to 14% in 2024, which signals strong potential but also

persistent capability gaps. These findings imply that AI-enhanced decision-making mechanisms are spreading, but not all organizations are equally prepared to benefit from them.

The international policy literature also highlights strategic risks and asymmetries. UNCTAD (2025) notes that AI development is highly concentrated, which may widen inequalities between firms and countries. The World Bank similarly emphasizes that AI opportunity depends on stronger digital foundations. These insights are important for managerial decision-making because they show that technology alone does not guarantee better decisions; institutions need the supporting systems and capabilities that allow AI outputs to be interpreted, trusted, and acted upon.

WIPO's recent work adds another dimension by showing the rapid expansion of generative AI and related innovation activity. This reinforces the idea that AI-driven decision mechanisms are not merely about efficiency; they are increasingly part of competitive strategy, innovation management, and business-model evolution.

Research Methodology

This article uses a qualitative review-based methodology. The research is based on the structured analysis of academic literature and institutional reports related to artificial intelligence, managerial decision-making, digital transformation, innovation, and organizational capabilities. The source base includes peer-reviewed research as well as recent publications from the OECD, World Bank, UNCTAD, and WIPO.

The methodological procedure included four stages. First, relevant sources were selected on the basis of topical relevance, analytical credibility, and direct applicability to managerial decision systems. Second, the selected materials were coded around recurring themes such as data-driven management, decision support,

predictive analytics, automation, governance, and organizational readiness. Third, cross-source comparison was conducted to identify common patterns and contradictions regarding AI-enabled managerial change. Fourth, an integrated conceptual framework was developed to explain how managerial decision-making mechanisms can be modernized through AI technologies.

The study does not use a primary quantitative survey or econometric estimation. Its contribution is conceptual and applied: it organizes a rapidly expanding body of literature into a coherent analytical structure that can support dissertation research, organizational diagnostics, and practical management reform.

Analysis and Results

1. The logic of traditional and AI-enabled decision-making

Traditional managerial decision-making mechanisms often follow a linear path: data collection, summary reporting, managerial interpretation, option selection, implementation, and later review. This process is often slow, periodic, and heavily dependent on the limited cognitive capacity of individual managers. In relatively stable environments, such mechanisms may be sufficient. However, under digital transformation, managerial decisions must increasingly be made in near real time and across a much larger informational field.

AI modernizes this logic by introducing continuous data processing, predictive modeling, pattern recognition, automated alert systems, and decision support recommendations. In other words, AI transforms decision-making from a largely retrospective process into a more anticipatory and adaptive one. This makes management more proactive rather than merely reactive. OECD evidence that AI supports productivity and operational improvement aligns with this interpretation.

Table 1.

Traditional vs. AI-enabled managerial decision-making

Dimension	Traditional mechanism	AI-enabled mechanism
Data use	Periodic, limited, often manual	Continuous, large-scale, automated
Analysis	Descriptive and retrospective	Predictive, prescriptive, real-time
Decision speed	Slow to moderate	Faster and more adaptive
Scenario evaluation	Limited number of alternatives	Multiple scenarios assessed rapidly
Error detection	Reactive	Earlier anomaly detection
Manager role	Primary analyzer and selector	Interpreter, supervisor, and final decision-maker
Learning cycle	Occasional review	Continuous feedback and updating

Source: Author's synthesis.

2. Core mechanisms through which AI modernizes managerial decisions

The analysis shows that AI modernizes decision-making through five major mechanisms.

First, intelligent data aggregation. AI can collect and process structured and unstructured data from financial systems, operations, customer interactions, markets, and digital platforms. This expands the informational base of management and reduces dependence on fragmented reports.

Second, predictive analytics. AI can forecast demand, cash flow, customer churn, inventory needs, and performance deviations. This allows managers to make decisions before problems fully emerge rather than after they appear.

Third, scenario modeling and option generation. AI tools can simulate alternative actions, compare projected outcomes, and rank options according to specified goals. This is especially useful in strategic planning and risk management.

Fourth, anomaly detection and risk signaling. AI can identify unusual patterns in finance, operations, or customer behavior, helping managers detect fraud, inefficiency, or operational stress earlier.

Fifth, adaptive feedback. AI systems can learn from outcomes and update future recommendations, thereby shortening the organizational learning cycle. The World Bank's emphasis on stronger AI foundations and OECD's evidence on efficiency gains support this mechanism-based interpretation.

Table 2.

AI mechanisms and their managerial effects

AI mechanism	Managerial application	Expected effect
Data aggregation	Integrating sales, finance, operations, and market data	More complete information base
Predictive analytics	Forecasting demand, liquidity, and performance	Better anticipation and planning
Scenario modeling	Comparing strategic options	Higher-quality strategic choices
Anomaly detection	Monitoring costs, risks, and irregularities	Faster risk response
Adaptive feedback loops	Learning from outcomes and updating models	Continuous improvement of decisions

Source: Author's synthesis.

3. Functional areas of application

AI-enabled decision mechanisms can be used across nearly all areas of management.

In strategic management, AI can support market sensing, competitor tracking, and strategic prioritization. Managers can use AI-generated forecasts to identify growth opportunities and emerging threats more quickly.

In financial management, AI can improve budgeting, liquidity management, cost control, and fraud detection. Decision-makers can rely on more precise forecasting and earlier warning systems.

In marketing and customer management, AI can support segmentation, personalized offers, campaign timing, and sentiment analysis. This improves commercial decision precision.

In operations, AI can optimize production planning, scheduling, inventory control, and logistics coordination. OECD materials indicating lower defects and reduced waste in certain AI-using production contexts are consistent with this operational interpretation. (oecd.org)

In human resources, AI can assist in workforce planning, skills mapping, and learning design. However, this function must be managed very carefully due to bias and fairness risks.

4. Main risks and limitations

Despite its advantages, AI-based decision-making mechanisms are not inherently reliable or neutral. The analysis identifies several major risks.

The first risk is data dependency. If the data fed into AI systems are poor, incomplete, biased, or outdated, the resulting recommendations can mislead decision-makers.

The second risk is opacity. Some AI systems generate outputs that are difficult for managers to interpret. If managers cannot understand the logic of an AI recommendation, trust and accountability become weaker.

The third risk is over-automation. AI should support managerial judgment, not replace it. Excessive reliance on algorithmic outputs may reduce contextual reasoning and strategic reflection.

The fourth risk is ethical and legal exposure. AI decision systems can create privacy, discrimination, cybersecurity, and compliance problems if not properly governed.

The fifth risk is organizational mismatch. Some firms adopt AI without adapting workflows, incentives, or staff skills, which leads to underuse or symbolic adoption. OECD, UNCTAD, and World Bank sources all suggest that capability and readiness are decisive in determining whether AI generates real organizational value.

Table 3.

Key risks and governance responses

Risk	How it affects decisions	Recommended governance response
Poor data quality	Distorted forecasts and weak recommendations	Data standards, cleansing, and validation
Low explainability	Weak trust and difficult accountability	Use interpretable models where possible and require explanation layers
Over-automation	Reduced managerial judgment	Keep human review in high-stakes decisions
Ethical and legal issues	Bias, privacy violations, regulatory exposure	AI policies, audits, compliance checks, documented controls
Capability gaps	Poor implementation and low usage	Staff training, leadership development, cross-functional teams

Source: Author's synthesis.

5. Framework for modernizing decision-making mechanisms

Based on the literature, managerial decision-making mechanisms can be effectively modernized through AI when five conditions are met.

First, strategic alignment. AI applications must be connected to specific decision problems such as demand forecasting, risk detection, pricing, budgeting, or customer retention. Technology should follow managerial priorities.

Second, data maturity. Organizations need high-quality, integrated, accessible data to support AI systems. Without this foundation, decision modernization remains superficial.

Third, human capability. Managers and staff need digital literacy, analytical understanding, and the ability to critically interpret AI outputs rather than merely accept them.

Fourth, process redesign. AI should be embedded into actual decision workflows. It should shape how information is collected, evaluated, escalated, and acted upon.

Fifth, responsible governance. Organizations need rules for transparency, accountability, privacy, human oversight, and performance review. The World Bank and OECD both emphasize that AI benefits depend on strong institutional and organizational foundations.

Table 4.

Integrated framework for AI-based decision modernization

Pillar	Managerial content	Practical instruments	Expected result
Strategic alignment	Define priority decision domains for AI	AI roadmap, use-case portfolio, target KPIs	Business relevance and measurable impact

Data maturity	Build reliable and integrated information systems	ERP, CRM, dashboards, data governance standards	Higher-quality analytical inputs
Human capability	Strengthen managerial and staff readiness	Training, AI literacy, decision workshops	Better interpretation and use of AI outputs
Process redesign	Integrate AI into decision workflows	Automated alerts, predictive dashboards, workflow tools	Faster and more consistent decisions
Responsible governance	Control risk and protect trust	AI policy, ethics rules, human approval, audits	Sustainable and accountable decision systems

Source: Author's development based on the reviewed literature.

6. Suggested performance indicators

To measure the modernization of decision-making mechanisms, organizations may use the following indicators:

– reduction in decision cycle time,
– improvement in forecast accuracy,
– percentage of decisions supported by predictive analytics,
– reduction in operational or financial anomalies,
– increase in successful strategic interventions,
– level of manager satisfaction with AI tools,
– share of AI pilots scaled into routine decision processes,

– reduction in decision errors or rework.

These indicators help organizations shift from symbolic AI adoption toward measurable managerial improvement.

Conclusion

Artificial intelligence technologies are transforming the logic of managerial decision-making. Under digital transformation, managers need faster, more accurate, and more adaptive mechanisms for interpreting information and selecting actions. AI can contribute significantly to this need by enhancing data aggregation, prediction, scenario analysis, anomaly detection, and feedback learning.

However, the article has shown that AI does not automatically produce better decisions. Its effectiveness depends on strategic alignment, data quality, organizational capability, workflow redesign, and responsible governance. This means that the modernization of decision-making mechanisms is not only a technological issue but also a managerial and institutional one.

The central conclusion of this study is that AI should be used as a tool for augmented managerial intelligence. It is most valuable when it strengthens human judgment, accelerates organizational learning, and improves the consistency and adaptability of management systems. Future research can deepen this area through case studies, survey-based assessments of AI readiness, sectoral comparisons, and econometric analysis of AI-supported decision outcomes.

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