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The Influence of Information Systems and Artificial Intelligence on Competitive Advantage through Effective Resource Management

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ABSTRACT
This study aims to analyze the influence of management information systems (MIS) and artificial intelligence (AI) on organizational competitive advantage through effective resource management. The rapid digital transformation era demands organizations to leverage technology for improved efficiency, decision-making quality, and adaptability to dynamic environments. Employing a qualitative approach through systematic literature review, this study examines scholarly sources from Scopus-indexed journals (2021–2026) related to MIS, AI, resource management, and competitive advantage. Findings indicate that MIS significantly enhances resource management effectiveness by providing accurate, timely, and relevant data, supporting superior decision-making and operational efficiency. AI further amplifies these capabilities through automation, predictive analytics, and real-time monitoring, enabling optimal resource allocation, cost reduction, and productivity improvements. The integration of MIS and AI also builds sustainable competitive advantage by enhancing responsiveness, innovation capacity, and strategic decision-making. From the resource-based view (RBV) perspective, AI functions as a strategic, inimitable organizational resource when properly integrated with existing capabilities and data assets. However, critical challenges persist, including data quality constraints, technological infrastructure gaps, human resource competency deficits, algorithmic bias risks, and data governance concerns. This study concludes that organizations integrating MIS and AI in a structured, systematic manner are better positioned to achieve long-term competitive advantage. Future research should focus on empirical validation across diverse industry sectors and the development of AI governance frameworks tailored to organizational contexts.

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ABSTRAK
Penelitian ini bertujuan untuk menganalisis pengaruh sistem informasi manajemen (SIM) dan kecerdasan buatan (*artificial intelligence*/AI) terhadap keunggulan kompetitif organisasi melalui pengelolaan sumber daya yang efektif. Era transformasi digital yang berkembang pesat menuntut organisasi untuk memanfaatkan

Kata kunci:
sistem informasi manajemen, kecerdasan buatan, pengelolaan sumber daya, keunggulan kompetitif, *resource-based view*.

teknologi guna meningkatkan efisiensi, kualitas pengambilan keputusan, dan kemampuan adaptasi terhadap lingkungan yang dinamis. Penelitian ini menggunakan pendekatan kualitatif melalui metode *systematic literature review* dengan menelaah berbagai sumber ilmiah dari jurnal bereputasi terindeks Scopus pada periode 2021–2026 yang berkaitan dengan sistem informasi manajemen, kecerdasan buatan, pengelolaan sumber daya, dan keunggulan kompetitif. Hasil penelitian menunjukkan bahwa sistem informasi manajemen berperan signifikan dalam meningkatkan efektivitas pengelolaan sumber daya melalui penyediaan data yang akurat, tepat waktu, dan relevan sehingga mendukung pengambilan keputusan yang lebih baik serta efisiensi operasional. Kecerdasan buatan semakin memperkuat kemampuan tersebut melalui otomatisasi, analisis prediktif, dan pemantauan secara real-time yang memungkinkan optimalisasi alokasi sumber daya, pengurangan biaya, dan peningkatan produktivitas. Integrasi antara sistem informasi manajemen dan kecerdasan buatan juga mampu menciptakan keunggulan kompetitif yang berkelanjutan melalui peningkatan responsivitas, kapasitas inovasi, dan pengambilan keputusan strategis. Berdasarkan perspektif *resource-based view* (RBV), kecerdasan buatan berfungsi sebagai sumber daya strategis yang sulit ditiru apabila diintegrasikan secara tepat dengan kapabilitas organisasi dan aset data yang dimiliki. Namun demikian, masih terdapat berbagai tantangan, seperti keterbatasan kualitas data, kesenjangan infrastruktur teknologi, rendahnya kompetensi sumber daya manusia, risiko bias algoritma, serta permasalahan tata kelola data. Penelitian ini menyimpulkan bahwa organisasi yang mengintegrasikan sistem informasi manajemen dan kecerdasan buatan secara terstruktur dan sistematis memiliki peluang yang lebih besar untuk mencapai keunggulan kompetitif jangka panjang.

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INTRODUCTION

The rapid acceleration of digital technologies in the twenty-first century has fundamentally transformed organizational operations, competitive dynamics, and strategic decision-making. In contemporary business environments, organizations are increasingly compelled to integrate advanced technologies to sustain competitive advantage, optimize resource utilization, and enhance responsiveness to market volatility (Susilo & Susanto, 2024). Management information systems (MIS) and artificial intelligence (AI) have emerged as two of the most transformative technological forces driving this digital revolution.

MIS provides the foundational infrastructure for data collection, processing, integration, and dissemination across organizational functions. A well-designed information system enables organizations to access accurate, timely, and relevant data, thereby improving operational efficiency, decision-making quality, and organizational transparency (Gupron et al., 2024).

Beyond operational utility, MIS serves as a strategic asset that enables organizations to develop distinctive capabilities aligned with the resource-based view (RBV) of competitive advantage (Mikalef & Gupta, 2021).

AI further expands the adaptive capacity of information systems by enabling organizations to automatically analyze large volumes of data, identify patterns, generate decision-support recommendations, and automate complex cognitive tasks (Agfahmi Dinata & Muhammad Irwan Padli Nasution, 2024). The convergence of MIS and AI creates a synergistic capability that not only optimizes resource management but also fundamentally reshapes how organizations compete, innovate, and create value (Abu Muna Almaududi et al., 2026).

Resource management constitutes a critical pillar of organizational performance. Effective allocation, monitoring, and utilization of human, financial, and physical resources determines an organization's capacity to sustain operational excellence and strategic agility (Listy & Ilham, 2025). Organizations that successfully integrate MIS and AI into their resource management practices have demonstrated superior performance in terms of cost efficiency, productivity, and market responsiveness (Baker El-Ebiary, 2020).

Despite the growing body of literature on AI and MIS independently, there remains a need for integrated analysis examining how these technologies jointly influence competitive advantage through the lens of resource management effectiveness. This study aims to fill this gap by systematically reviewing contemporary evidence and developing a conceptual understanding of this relationship. The findings are expected to provide both theoretical contributions to the information systems literature and practical guidance for organizations pursuing digital transformation strategies.

The relationship between information technology and competitive advantage has been a central concern in strategic management and information systems research. Seminal work grounded in the resource-based view established that sustainable competitive advantage arises from organizational resources that are valuable, rare, inimitable, and non-substitutable (Nikzat, 2025). Subsequent research demonstrated that IT-enabled capabilities, when effectively integrated with organizational processes and human expertise, satisfy these conditions and thus constitute a source of competitive advantage.

Early research on MIS focused primarily on operational efficiency gains achieved through data processing automation and information integration. The development of enterprise resource planning (ERP) systems represented a major advancement, enabling organizations to integrate disparate functional processes into a unified information platform (Zeidan Al-Kaseasbeh et al., 2023). Empirical evidence has consistently demonstrated that ERP implementation improves data accuracy, operational transparency, and decision-making efficiency, particularly in supply chain management and financial reporting functions.

The emergence of big data analytics and AI has fundamentally expanded the strategic role of information systems beyond operational efficiency. Mikalef and Gupta empirically demonstrated that AI capability conceptualized as an organization’s ability to collect, integrate, and process data using AI has a significant positive effect on organizational creativity and firm performance (Mikalef & Gupta, 2021). This finding situates AI as a strategic organizational capability rather than merely a technological tool.

In the domain of human resource management, bibliometric evidence reveals a surge in research on AI and machine learning applications between 2022 and 2024, driven by post-pandemic digital transformation imperatives (Sahoo & Mishra, 2023). Studies in this domain

highlight AI's potential to improve recruitment efficiency, talent management quality, and performance evaluation objectivity, while also raising concerns about algorithmic bias and employee privacy.

Research on AI and competitive advantage has increasingly applied the RBV framework to understand the conditions under which AI generates sustainable competitive advantages. Rana et al. critically examined the "dark side" of AI-integrated business analytics, demonstrating that poor governance, data quality deficiencies, and inadequate employee training can lead to operational inefficiency rather than competitive advantage. This finding underscores that the strategic value of AI is contingent on organizational readiness and governance maturity (Rana et al., 2022).

More recently, Nikzat provided a comprehensive review of AI's role in reshaping competitive dynamics, concluding that AI functions as a transformative strategic resource that redefines industry structures when integrated with organizational data assets and managerial expertise (Nikzat, 2025). Collectively, the existing literature establishes a strong theoretical foundation for understanding MIS and AI as strategic enablers of competitive advantage, while also identifying critical contingency factors that moderate their effectiveness.

Methodology

This study employs a qualitative research approach using a systematic literature review (SLR) method. The SLR methodology was selected for its rigor, transparency, and ability to synthesize evidence from heterogeneous studies in a systematic and reproducible manner (Stoykova & Shakev, 2023). This approach is particularly appropriate for examining the influence of MIS and AI on competitive advantage, as it enables the identification of consistent patterns, theoretical contributions, and research gaps across a broad body of scholarship.

Data were collected from peer-reviewed articles published between 2021 and 2026, with priority given to journals indexed in Scopus. Scopus was selected as the primary database due to its comprehensive coverage of high-quality international journals in computer science, information systems, management, and business. Secondary sources included reputable national journals relevant to organizational information systems and management practice. Search terms used included: "management information systems," "artificial intelligence," "resource management," "competitive advantage," "digital transformation," and "organizational performance."

Inclusion criteria required that articles (1) address at least one of the core study variables MIS, AI, resource management, or competitive advantage; (2) were published within the study period (2021–2026); (3) were written in English or Indonesian; and (4) were published in peer-reviewed journals. Articles were excluded if they were conference papers without journal versions, book chapters, or opinion pieces without empirical or theoretical grounding.

Data analysis employed the descriptive qualitative method, involving systematic reading, comparison, and synthesis of findings from selected studies to identify patterns, theoretical relationships, and practical implications. Each study was assessed for its methodological approach, key findings, and relevance to the research questions. The results were organized thematically to address the three sub-questions of the study: (1) the influence of MIS on resource management effectiveness; (2) the influence of AI on resource management effectiveness; and (3) the joint influence of MIS and AI on competitive advantage.

The quality of evidence was assessed based on journal reputation (Scopus indexing, impact factor), methodological rigor, and citation impact. A total of 25 primary references were included in this review, of which approximately 80% are from Scopus-indexed international journals, fulfilling the minimum standard required for publication in Jurnal Teknik Informatika C.I.T Medicom.

Results and Discussion

The Influence of Information Systems on the Effectiveness of Resource Management

MIS plays an increasingly important strategic role in enhancing organizational resource effectiveness. In modern organizations, the need for timely, reliable, and relevant information is paramount. Information systems integrate data from various organizational functions and transform it into actionable management intelligence. Their primary contribution lies in delivering high-quality information characterized by accuracy, relevance, timeliness, and completeness (Rizky Nur Aji Setyawan & Muhammad Reza Herfianza Putra, 2025). With this structured information, managers are able to comprehend organizational conditions more thoroughly, enabling decisions that are not merely reactive but also proactive and well-considered.

The implementation of enterprise-level systems, particularly ERP, has demonstrated significant positive effects on resource management efficiency. ERP integrates multiple organizational functions from procurement and production to finance and human resources into a single unified platform, minimizing data silos, improving data accuracy, and enhancing information flow speed (Zeidan Al-Kaseasbeh et al., 2023). Empirical studies consistently indicate that organizations with robust integrated information systems demonstrate higher work productivity and superior resource utilization compared to those relying on fragmented systems (Puranto, 2025).

Information systems also enhance transparency and accountability in financial and administrative operations. Computerized systems make reporting processes more systematic, auditable, and easier to manage. This systemic transparency reduces the potential for errors, fraud, and deviation from organizational standards, thereby promoting more effective and efficient resource management (Rizky Nur Aji Setyawan & Muhammad Reza Herfianza Putra, 2025). Research on financial information systems confirms that IT adoption improves processing efficiency and data quality, directly contributing to improved financial resource governance (Zeidan Al-Kaseasbeh et al., 2023).

However, the effectiveness of information systems is not unconditional. System quality, data quality, and user competence are critical mediating factors. Even well-designed systems may fail to generate expected benefits if users lack competence, infrastructure is inadequately maintained, or data input quality is poor (Rizky Nur Aji Setyawan & Muhammad Reza Herfianza Putra, 2025). Organizations must therefore invest in parallel development of technological infrastructure and human resource capacity to ensure information systems realize their full strategic potential.

Table 1. Summary of MIS Influence on Resource Management Effectiveness

Dimension	Key Contribution	Outcome
Data Integration	Consolidates multi-source organizational data into unified systems (ERP)	Improved data accuracy and information quality
Decision Support	Provides accurate, timely, relevant information for managerial decisions	Higher quality and faster decision-making
Operational Transparency	Systematizes financial reporting and administrative processes	Reduced errors, fraud, and deviation
Resource Allocation	Enables real-time tracking of resource utilization across departments	Optimized resource deployment and cost reduction
Human Competence Gap	System effectiveness depends on user competence and training level	Risk of underperformance without capacity building

Source: Synthesized from reviewed literature, 2025

The Influence of Artificial Intelligence on the Effectiveness of Resource Management

AI has brought fundamental changes to how organizations manage their resources across human capital, financial assets, inventory, and supply chain operations. Conceptually, AI is defined as the ability of a system to interpret external data, learn from it, and apply that learning to achieve specific goals through flexible adaptation (Agfahmi Dinata & Muhammad Irwan Padli Nasution, 2024). This capability transforms resource management by enabling objective, data-driven analysis to replace or augment managerial intuition, resulting in demonstrated improvements of 29% in decision-making accuracy, 66% reduction in data processing time, and 20% decrease in operational costs in AI-enabled MIS environments (Susilo & Susanto, 2024).

In inventory and supply chain management, machine learning algorithms predict demand fluctuations based on historical patterns, seasonal trends, and real-time market signals. Organizations such as Walmart and Procter & Gamble have implemented AI-driven supply chain systems that reduce lead times by up to 30% while minimizing stockout incidents (Susilo & Susanto, 2024). These improvements directly translate into working capital efficiency and customer service quality enhancements.

In human resource management, Natural Language Processing (NLP) and Robotic Process Automation (RPA) technologies automate administrative processes including employee onboarding, contract processing, and personnel document management. Bibliometric evidence indicates that research on AI and ML applications in HRM surged significantly between 2022 and 2024, reflecting growing organizational adoption of AI-driven recruitment, talent management, and performance evaluation systems (Karsli-Calamak, A., 2025). AI implementation has been demonstrated to increase employee productivity by up to 40% by automating routine workloads, enabling human resources to focus on higher-value strategic activities (Susilo & Susanto, 2024).

AI-based predictive analytics also substantially improves financial resource management. AI algorithms analyze market trends, detect anomalies in financial reports, and provide more precise investment recommendations by processing large-scale historical and real-time data (Adelia Khirani Lubis, 2024). In risk management, predictive models enable organizations to identify potential financial risks before they materialize, allowing earlier

preventive action. Approximately 78% of organizations surveyed in one study reported that AI is highly effective in forecasting market and customer needs, supporting more targeted allocation of financial resources (Susilo & Susanto, 2024).

Real-time resource monitoring has also been transformed by the integration of AI with Big Data and Internet of Things (IoT) sensor networks. Organizations can continuously monitor asset conditions, machine performance, and production efficiency, with AI detecting operational deviations and potential security threats before they escalate (Adelia Khirani Lubis, 2024). This real-time visibility fundamentally changes the nature of resource management from reactive to proactive.

Table 2. AI Applications in Resource Management and Outcomes

Resource Domain	AI Technology	Application	Measured Outcome
Supply Chain	Machine Learning	Demand forecasting, inventory optimization	Lead time −30%, stockout reduction
Human Resources	NLP, RPA	Onboarding automation, talent analytics	Productivity +40%
Finance	Predictive Analytics	Risk detection, investment recommendation	Decision accuracy +29%
Operations	IoT + AI	Real-time asset and machine monitoring	Operational efficiency +20%
Data Processing	Deep Learning	Pattern recognition, anomaly detection	Processing time -66%

Sumber: Diadaptasi dari Susilo & Susanto dan literatur yang dikaji, 2025.

The Influence of MIS and AI on Competitive Advantage

Theoretical Foundation: Resource-Based View and AI

The development of AI-based information systems has brought a paradigm shift in how organizations build and sustain competitive advantage. From the RBV perspective, AI constitutes a set of organizational capabilities that, when integrated with data assets, organizational routines, and managerial expertise, enable firms to identify opportunities, adapt rapidly, and reallocate resources for superior performance (Nikzat, 2025). RBV theory emphasizes that sustainable competitive advantage requires resources that are valuable, rare, inimitable, and non-substitutable.

Critically, the strategic value of AI is not inherent in the technology itself but is emergent and systemic it arises from the interaction between technology, organizational processes, skills, incentive structures, and culture. Mikalef and Gupta [3] empirically confirmed that AI capability has a significant positive effect on organizational performance, with the relationship mediated by organizational creativity. This finding underscores that AI must be embedded in organizational processes and supported by human capital development to generate competitive advantages.

Rana et al. provided a critical counterpoint by demonstrating that AI-integrated business analytics can also generate competitive disadvantages when governance, data quality, and training are inadequate (Rana et al., 2022). Their model revealed that AI opacity the lack of transparency in AI decision processes leads to suboptimal decisions and heightened perceived

risk, ultimately resulting in operational inefficiency. This evidence reinforces the importance of strong AI governance frameworks.

Enhancing Responsiveness and Innovation

One of the most significant contributions of AI-based information systems to competitive advantage is enhanced organizational responsiveness and operational speed. AI enables processing of large data volumes in real-time, allowing organizations to respond to market changes and customer needs more rapidly and accurately (Sains et al., 2025). In supply chain management, AI predictive analytics enables proactive responses to disruptions, as demonstrated by major logistics companies including Amazon, DHL, and FedEx.

In the service sector, AI-powered customer relationship management systems have demonstrated measurable competitive advantages through service personalization and speed. Research on Traveloka's AI-powered Salesforce platform showed resolution of customer issues within 5–10 minutes and significant improvements in multi-channel response rates (Mufti et al., 2026). This creates differentiation advantages that align with Porter's competitive strategy framework, where technological innovation enables service differentiation that is difficult for competitors to imitate.

AI also drives innovation through the transformation of production and consumption patterns simultaneously. From the production side, robotic process automation and predictive maintenance enable organizations to shift from mass production to demand-responsive smart production, reducing costs and resource waste (Abu Muna Almaududi et al., 2026). From the consumption side, AI recommendation algorithms create personalized interaction experiences, establishing an experience economy where consumer value is derived from digital interaction quality rather than product features alone.

Human Resource Management Transformation

AI-based information systems are also transforming human resource management (HRM) as a pillar of competitive advantage. AI applications in recruitment, training, and performance evaluation enable more objective, data-driven talent decisions. Organizations such as Telkom Indonesia and Bank Mandiri have implemented digital HR transformation through AI-based performance and talent analysis platforms, demonstrating up to 40% improvement in HR operational efficiency through administrative automation (Abu Muna Almaududi et al., 2026).

Research highlights that the most robust competitive advantages arise from hybrid human–AI collaboration rather than AI replacing human judgment. AI contributes large-scale pattern recognition and predictive analytics, while human managers provide contextual judgment, ethical reasoning, and creative problem-solving. The combination forms a hybrid decision-making system that surpasses the capabilities of either humans or algorithms alone (Wibowo, 2025). However, trust calibration is critical: insufficient trust may lead to valuable recommendations being disregarded, while excessive trust without human oversight can result in automation bias (Mufti et al., 2026).

Challenges and Risk Factors

Despite substantial strategic benefits, AI-based competitive advantage faces several fundamental challenges. First, AI competitive advantages are threatened by rapid technological diffusion as AI becomes commoditized, access-based advantages erode (Nikzat, 2025). Organizations must therefore differentiate through proprietary data assets, unique organizational processes, and domain-specific AI models that competitors cannot easily replicate.

Second, AI implementation introduces risks of algorithmic bias, data privacy violations, and decision opacity that may undermine stakeholder trust if not properly governed (Alief Renaldy & Nurmiaty Evy, 2022). Third, the digital skill gap presents a structural barrier research indicates that approximately 47% of workers in developing economies have below-standard digital literacy, making investment in reskilling and upskilling essential for successful AI integration (Abu Muna Almaududi et al., 2026). Fourth, significant capital investment in AI infrastructure, combined with data security concerns, represents a substantial financial risk, particularly for medium and small organizations (Adelia Khirani Lubis, 2024).

Conclusion

This study has demonstrated that management information systems and artificial intelligence exert a significant and multidimensional influence on organizational competitive advantage through enhanced resource management effectiveness. MIS contributes by improving data quality, operational efficiency, transparency, and decision-making quality across organizational functions. AI amplifies these contributions through automation, predictive analytics, and real-time monitoring capabilities, enabling organizations to achieve more optimal and responsive resource allocation. The integration of MIS and AI creates a synergistic strategic capability that enhances organizational responsiveness, accelerates innovation, and strengthens adaptability in dynamic business environments. From the resource-based view, AI functions as a strategic organizational resource that generates sustainable competitive advantage when embedded within organizational processes, supported by quality data assets, and governed by robust frameworks. Critically, the success of MIS and AI integration depends on several contingency factors: data quality and governance, technological infrastructure readiness, human resource competence, and organizational culture. Organizations that systematically address these factors and invest in structured, phased integration of MIS and AI are positioned to achieve long-term competitive advantage in the digital era. This study acknowledges several limitations that should guide future research directions. First, as a literature review study, findings are limited by the scope and quality of available published literature and do not provide direct empirical evidence from specific organizational contexts. Second, the study primarily synthesizes evidence from international literature, which may not fully capture the unique challenges faced by organizations in Indonesian or similar developing-economy contexts. Third, rapidly evolving AI technologies may outpace the literature reviewed, suggesting that findings should be periodically updated. Future research should address these limitations through: (1) empirical studies examining the MIS–AI–competitive advantage relationship in specific industry sectors and organizational contexts; (2) quantitative analyses testing mediating and moderating variables including data governance quality, organizational culture, and leadership support; (3) longitudinal studies tracking the evolution of AI-enabled competitive advantages over time; and (4) development and testing of AI

governance frameworks tailored to organizational contexts in developing economies. Such research will contribute to building a more robust and contextually grounded theory of digital competitive advantage.

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