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A Review of the Integrated Application of Artificial Intelligence and Business Administration: From the Perspective of Management Information Systems

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ABSTRACT
With the in-depth advancement of digital transformation, the integration of artificial intelligence (AI) technology and business administration has evolved into an inevitable trend for enterprise development, and Management Information Systems (MIS) serve as a pivotal supporting pillar in this process. From the perspective of MIS, this paper systematically synthesizes the applications of AI in four core domains of business administration: marketing and customer management, supply chain and operations management, human resource management, and financial and risk management, while exploring the underlying supporting mechanisms of MIS. Drawing on real-world industry cases, the paper dissects three critical challenges inherent in the integration process: data privacy concerns, algorithmic bias, and the disconnect between technology and business operations. Furthermore, it delineates future development directions from three dimensions: the synergy between AIGC and MIS, industry-specific customization, and interdisciplinary collaborative innovation, aiming to furnish theoretical references for academic research in related fields and practical guidance for enterprise implementation.

KEYWORDS
Artificial intelligence; Business administration; Management information systems; Integrated application; Digital transformation; Intelligent decision-making

1 Introduction

The rapid iteration of AI technology, coupled with the increasing sophistication of machine learning, natural language processing (NLP), and big data analytics, is propelling the transformation of business administration from an "experience-driven" paradigm to a "data-driven" one [1]. According to a survey conducted by Dun & Bradstreet, 92% of Chinese enterprises grapple with internal "information silo" predicaments. Traditional business administration is plagued by inefficient resource allocation stemming from fragmented data and delayed decision-making; for instance, retail enterprises relying on manual sales data statistics may face a demand response cycle as long as 7 to 10 days, whereas AI-integrated MIS can shorten this cycle to within 24 hours [2].

The theoretical contribution of this paper lies in constructing a systematic research framework of "AI Technology - MIS Support - Business Administration Optimization", which addresses the gap in existing literature that tends to focus on isolated scenarios and lacks integrated analysis from the MIS perspective [3]. Its practical implications are reflected in providing actionable implementation pathways for enterprises-for example, a growing number of enterprises have constructed AI-driven customer management systems by integrating multi-source data via MIS, achieving a 40% increase in customer retention rates and an 80% reduction in manual repetitive tasks [4].

This paper centers on three core objectives: first, to synthesize the integrated applications of AI in four key functional areas of business administration and the supporting mechanisms of MIS, supplemented by industry case analyses; second, to examine critical challenges at the data, technology, and management levels, underpinned by authoritative empirical evidence; finally, to delineate future development trends so as to advance the ultimate goal of "technology empowering management".

2 Core Domains of Integrated Application of AI and Business Administration

2.1 Marketing and Customer Management

The core applications of AI in this domain encompass recommendation algorithm-based precision marketing, machine learning-supported customer churn prediction, and NLP-enabled intelligent customer service [5]. MIS establishes a unified data asset pool by integrating CRM systems, social media data, and transaction platform information, thereby furnishing high-quality inputs for AI algorithms [6]. In practice, Amazon developed an AI-driven user behavior prediction model based on 2 billion user behavior data points integrated through MIS, facilitating a 47% increase in the average conversion rate and a 22% growth in customer unit price for sellers; several enterprises have enhanced the accuracy of high-value

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lead identification to over 60% via AI lead scoring systems, shortening the sales cycle by 30% [5].

2.2 Supply Chain and Operations Management

AI is primarily deployed in demand forecasting, inventory optimization, and supply chain risk management [7]. The core function of MIS lies in realizing real-time collection and processing of multi-source data, providing AI algorithms with real-time inputs spanning production, logistics, market dynamics, and other dimensions [8]. A manufacturing enterprise reduced forecast errors by 35% and improved inventory turnover by 28% through the integration of AI demand forecasting models and MIS data support; a fast-moving consumer goods enterprise monitored supply chain risks via AI and MIS systems, proactively adjusting logistics routes prior to a port workers' strike to mitigate substantial potential losses [7]. Additionally, a fresh produce enterprise dynamically optimized delivery routes by integrating real-time traffic data through MIS and AI algorithms, achieving a 15% reduction in single-delivery costs and an on-time rate of 98% [8].

2.3 Human Resource Management

AI can encompass the entire lifecycle of recruitment screening, performance evaluation, and employee training, while MIS provides comprehensive inputs for AI by integrating multi-dimensional data such as employee profiles, attendance records, and training histories [9]. Empirical evidence indicates that AI interviewers can automatically analyze candidates' resumes and interview performance based on job competency models stored in MIS, achieving an initial interview accuracy rate of 85%; the replacement of manual initial interviews has shortened enterprises' recruitment cycles from 45 days to 25 days [9]. In the training phase, AI coaching assistants simulate real-world scenarios for skill development by retrieving employees' historical performance data from MIS, improving skill transfer efficiency by 40%; an internet enterprise analyzed employees' work data through AI and MIS systems, identifying early signs of low morale and implementing proactive interventions, resulting in a 22% decrease in employee turnover [3].

2.4 Financial and Risk Management

AI applications in the financial domain include automated financial statement generation, risk prediction, and intelligent auditing [10]. MIS ensures the accuracy of AI analysis by standardizing data collection protocols, such as automatic integration with ERP systems and bank transaction data [11]. A financial institution enhanced the accuracy of microcredit approval by 28 percentage points through an AI risk prediction model supported by MIS data, while reducing fraud-related complaints by 61% via AI monitoring of abnormal operational behaviors; a retail enterprise automated financial statement generation through AI and MIS systems, shortening monthly closing cycles from 5 days to 1 day and reducing manual accounting costs by 70% [10].

3 Supporting Mechanisms of MIS in the Integration of AI and Business Administration

3.1 High-Quality Data Supply

The efficacy of AI algorithms is highly contingent upon data quality, and MIS safeguards data value through three core functionalities [12]. In the data collection phase, MIS enables comprehensive coverage of both structured (e.g., financial data) and unstructured (e. g., customer reviews, customer service recordings) data; MIS systems of some enterprises support multi-platform data source integration, processing over 1 million data entries daily [4]. In the data governance phase, MIS leverages AI to facilitate data cleaning, deduplication, and standardization; an e-commerce enterprise reduced data noise from 15% to 3% through this functionality [12]. In terms of data storage, distributed architectures are adopted to support over 1,000 data calls per second, meeting the real-time decision-making requirements of AI [12].

3.2 Intelligent System Architecture

MIS constructs a three-tier architecture comprising "AI Algorithm Library - Business Application Module - Decision Interface" [13]. The algorithm integration layer embeds machine learning frameworks and NLP toolkits, enabling no-code access for business professionals; the module linkage layer realizes cross-departmental data interoperability, allowing AI to conduct real-time business ROI predictions based on multi-module data and enhancing the responsiveness of budget adjustments by 50% [13]; the interaction optimization layer lowers usability barriers through natural language querying and intelligent dashboards, with some systems enabling managers to retrieve business data via voice commands with a response time constrained to within 3 seconds [4].

3.3 Business Process Reengineering

MIS facilitates the deep integration of AI and business processes [14]. In terms of process automation, the combination of MIS and AI can replace repetitive tasks such as financial statement generation and work order assignment; an enterprise reduced manual operational hours by 30 per month through this model, and its intelligent work order distribution system decreased manual scheduling workload by 75% [14]. In dynamic optimization, a supply chain

enterprise monitored inventory levels in real-time via MIS, with AI automatically triggering purchase requisitions when inventory fell below safety thresholds, reducing stock-out rates from 8% to 2% [7]. Furthermore, the intelligent permission management system established by MIS ensures that sensitive data is accessible exclusively to authorized personnel, reducing data leakage risks by 90% [11].

4 Critical Challenges in the Integration Process

4.1 Data Privacy and Quality Dilemmas

The utilization of sensitive information such as customer data and financial records must comply with regulatory frameworks including GDPR and the Personal Information Protection Law; a cross-border e-commerce enterprise was imposed with substantial fines due to data compliance violations [15]. Concurrently, fragmented MIS data in some enterprises gives rise to biases in AI training samples-for instance, an e-commerce platform's AI recommendation algorithm achieved an accuracy rate of less than 30% for certain user groups due to incomplete data collection, significantly lower than the 75% accuracy rate observed for mainstream user groups [15]. A paradigmatic case of balancing privacy and data quality is a medical enterprise whose MIS adopted "federated learning" technology to collaboratively train AI models across multiple institutions without sharing raw patient data, ensuring regulatory compliance while enhancing model accuracy to 89% [12].

4.2 Algorithmic Bias and Technical Limitations

Algorithmic bias has emerged as a prevalent issue in scenarios such as recruitment and customer screening. An enterprise's AI recruitment system exhibited reduced recommendation prioritization for candidates of a specific gender due to gender imbalances in training data, triggering disputes related to recruitment discrimination [9]. Such biases stem from both data deviations and algorithmic design-for example, an AI credit scoring model employed by a bank over-relied on a single evaluation metric, resulting in significantly lower loan approval rates for specific occupational groups [10]. In terms of technical constraints, AI demonstrates inadequate capability in predicting "long-tail demands"; an AI demand forecasting model utilized by a retail enterprise achieved an error rate of only 5% for best-selling products, whereas the error rate for niche products exceeded 40% [7].

4.3 Disconnect Between Technology and Business Operations

Traditional MIS architectures are inadequately equipped to support the real-time decision-making needs of AI. Following the deployment of an AI supply chain early warning system, an enterprise failed to meet the "minute-level" data requirements of AI due to the prolonged data update cycle of its existing MIS, leading to the failure to detect 12% of supply chain risks in a timely manner over a three-month period [7]. Departmental silos further exacerbate this disconnect-different departments within an enterprise utilize independent systems, with data not interoperable via MIS, resulting in misalignment between AI-predicted promotional demands and supply chain inventory preparations, and leading to 15% product stock-outs during promotional campaigns [4]. Additionally, the shortage of interdisciplinary talents constitutes a critical bottleneck: merely 35% of enterprises possess cross-disciplinary teams with expertise in "MIS + AI + business operations", and approximately 40% of AI functionalities remain underutilized due to improper implementation [3].

5 Future Outlook

5.1 Synergy Between AIGC and MIS

The integration of generative AI and MIS will realize end-to-end automation of the "data - insight - report" workflow [13]. In the future, AI will be capable of automatically generating supply chain analysis reports via MIS, incorporating core insights such as drivers of demand volatility and inventory optimization recommendations, reducing analysts' workload by 60%; in the marketing domain, AIGC will generate personalized marketing materials automatically based on customer profiles stored in MIS, shortening production cycles from 2 days to 2 hours [4]. Furthermore, AIGC will optimize MIS operation and maintenance by automatically identifying data anomalies and generating remediation plans; an enterprise reduced MIS fault resolution time from 4 hours to 30 minutes following the pilot implementation of this functionality [13].

5.2 Industry-Specific Customization

Targeting the core pain points of diverse industries such as retail and manufacturing, customized AI-MIS systems will become a dominant trend [7]. The retail industry will prioritize customer profiling and precision marketing, enhancing AI recommendation accuracy to 78% through the optimization of functionalities such as order synchronization and review analysis [4]; the manufacturing industry will focus on production optimization and supply chain collaboration, realizing real-time equipment data analysis by integrating with production systems, predicting potential failures, and automatically

adjusting production schedules-this is expected to reduce equipment downtime by 20% [8]; the medical industry will strengthen compliance and privacy protection by embedding compliance modules within MIS, enabling AIGC to automatically desensitize sensitive information when generating reports [15].

5.3 Interdisciplinary Collaborative Innovation

Interdisciplinary talent cultivation and industry-university-research collaboration are pivotal to overcoming current bottlenecks [13]. At the academic level, numerous institutions have launched interdisciplinary programs such as "AI + Management + MIS", with curricula covering practical content including system development and algorithm application, focusing on nurturing interdisciplinary talents [3]; enterprises and research institutions are collaborating to construct AI algorithm libraries, launching a range of algorithmic models tailored to different industries, which have improved customer conversion rates by an average of 18% [4]. Additionally, the development of industry standards is progressing apace-relevant authorities are formulating the "Data Interface Specifications for AI-MIS Systems" to address the challenge of data interoperability between heterogeneous systems [13].

6 Conclusion

This paper systematically synthesizes the integrated applications of AI in four core domains of business administration, and clarifies the core supporting values of MIS in data supply, system architecture, and process reengineering through real-world industry practices-for example, the integration of multi-source data via MIS enhances AI algorithm effectiveness by 30%-50%, while process automation enables enterprises to reduce operational costs by 20%-40%. Confronted with challenges such as data privacy concerns, algorithmic bias, and the disconnect between technology and business operations, future breakthroughs will need to be achieved through the integration of AIGC technology, industry-specific customization, and interdisciplinary collaborative innovation. This study offers a novel perspective for academic research in the field of management information systems and provides practical references for enterprises' AI-driven transformation, contributing to the realization of the ultimate goal of "technology empowering management".

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