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Research on Digital and Intelligent Financial Applications in Municipal Higher Vocational Colleges Based on Large AI Models

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Abstract: Against the dual backdrop of global digitalization in education and the high-quality development of vocational education, municipal higher vocational colleges, as core institutions for cultivating regional technical and skilled talents, have made their financial digital and intelligent transformation a key driver for enhancing institutional governance efficiency and optimizing fiscal resource allocation. Traditional financial models suffer from prominent data silos, low process efficiency, weak decision-support capabilities, and lagging risk prevention, making them ill-suited to the practical demands of elevating vocational education quality. Large AI models, leveraging core capabilities such as natural language understanding, multimodal data processing, autonomous reasoning and prediction, and knowledge graph construction, offer a novel technical pathway for advancing the financial systems of higher vocational colleges from informatization to digital-intelligence integration. This study focuses on municipal higher vocational colleges, systematically reviewing the current applications and research progress of large AI models in university finance both domestically and internationally. It identifies common shortcomings in the digital-intelligent financial development of municipal vocational institutions in China and proposes an integrated application framework, "data governance–scenario empowerment–industry-finance integration–risk prevention," tailored to local institutional resources. By addressing practical disparities between domestic and international practices, the study provides theoretical insights and practical references for the intelligent transformation of financial systems in municipal higher vocational colleges, while also contributing a China case study to international research on financial digitalization in vocational education.

Keywords: AI large models; Municipal higher vocational colleges; Digital and intelligent finance; Industry-finance integration

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1. Introduction

Amid the global wave of digital transformation in education, the deep integration of artificial intelligence technology with higher education financial management has become an international consensus. Universities in developed countries such as those in Europe and America, leveraging their mature information technology

infrastructure and ecosystems, have pioneered the application of large-scale AI models in areas including financial auditing, budget forecasting, fund management, and audit supervision, establishing relatively comprehensive digital and intelligent financial management systems [1]. In China, policies such as the "Education Digitalization Strategy Action Plan" and the "Accounting Informatization Development Plan (2021–2025)" have been successively introduced, explicitly calling for accelerated intelligent transformation of educational finance and enhanced utilization of data as a key enabling factor alongside intelligent risk prevention and control [2].

Municipal higher vocational colleges are administered by municipal-level finance departments and exhibit typical characteristics such as diversified funding sources, moderate institutional scale, strong regional service orientation, and limited digital resources. Compared with undergraduate institutions and provincial higher vocational colleges, their financial digital transformation faces unique challenges including insufficient funding, complex system integration, shortage of interdisciplinary talents, and inadequate technological compatibility. Current domestic research predominantly focuses on undergraduate institutions or large higher vocational colleges, with limited targeted studies on municipal higher vocational colleges and a lack of comparative analyses and international case studies [3]. Addressing this gap, this paper conducts a systematic investigation into AI-powered financial application systems by comparing domestic and international implementation practices while considering the specific context of municipal higher vocational colleges, offering both theoretical insights and practical implications.

2. Comparison of the current application status of domestic and international large AI models in university finance

2.1. Current status of financial applications of large AI models in domestic and international universities

Universities in developed countries have pioneered digital infrastructure development with robust data foundations. Large-scale AI models have been extensively implemented in financial operations, establishing standardized and systematic application frameworks. Research and practice in this field focus on efficiency enhancement, compliance and risk management, and decision optimization, characterized by comprehensive application scenarios, mature technological integration, robust data governance systems, high interoperability, strong emphasis on compliance and privacy protection, and mature human-machine collaboration mechanisms [1]. In contrast, financial digitalization in domestic municipal higher vocational colleges has progressed steadily. Most institutions have implemented basic systems such as online reimbursement, budget management, and non-tax revenue management, while some have piloted AI applications. However, overall progress remains at an early stage, "primarily focused on digitalization with initial exploration of intelligence," showing significant gaps compared to international counterparts. Current applications are predominantly limited to basic scenarios like document recognition, automated duplicate detection, and fundamental audits. Challenges include pronounced data silos, insufficient funding, inadequate digital literacy among financial staff, and incomplete supporting policies. These systems primarily serve fiscal supervision and basic accounting needs, with weak capabilities for decision support and value creation, and lack customized AI financial solutions tailored to the unique characteristics of vocational education institutions [4].

2.2. Comparison of core differences in application practices between domestic and international markets

Overall, domestic and international universities exhibit significant systematic and phased differences in the financial application of large AI models, with core gaps concentrated across five dimensions: application depth, data governance, technological investment, talent support, and value orientation (**Table 1**). At the application level, foreign universities have achieved deep integration of large AI models throughout the entire financial process and comprehensive scenario coverage, emphasizing data-driven decision-making and value creation; domestic municipal vocational colleges remain in the early stage of transitioning from informatization to intelligentization, with applications largely limited to superficial tasks such as document recognition and basic auditing, demonstrating insufficient intelligence levels and application depth [5]. In terms of data governance, foreign universities typically establish university-wide unified data platforms to achieve data interoperability and standardized integration across financial, academic, research, and human resources systems, providing high-quality data support for large model training; domestic institutions commonly face issues like data silos, fragmented systems, and inconsistent standards, making data quality and usability inadequate for advanced intelligent applications [6]. Regarding technological investment, foreign universities enjoy sufficient resources to develop customized models and deploy systems; domestic institutions, constrained by limited resources, predominantly rely on third-party lightweight tools with weaker autonomy and adaptability [7]. In terms of talent support, foreign universities possess ample interdisciplinary digital finance professionals with mature human-machine collaboration mechanisms; domestic institutions lack sufficient digital finance talent reserves, and financial staff require enhanced technical proficiency and application capabilities [8]. In terms of value objectives, foreign universities adopt multiple orientations such as efficiency enhancement, decision optimization, and risk prevention and control, whereas domestic institutions place greater emphasis on meeting fiscal regulatory and basic accounting requirements, with weaker capabilities in decision support and management empowerment [3,11]. These differences stem from variations in IT development stages, resource endowments, and institutional positioning, providing clear pathways for optimizing and improving the financial digital and intelligent transformation of municipal higher vocational colleges in China.

Table 1. Comparison of core differences in financial application of large AI models between domestic and international universities

Dimension for Comparison	Foreign universities (including vocational colleges)	Domestic municipal higher vocational colleges
Application Phase	Deep integration, comprehensive coverage across all scenarios, with a focus on empowering decision-making	Primary pilot projects and superficial applications, focusing on basic accounting
Data Foundation	Unified data platform with standardized protocols and interoperability	Data silos are prominent, with inconsistent standards and subpar quality.
Technical Investment	Sufficient funding is available, with comprehensive customized models and systems.	Limited investment, relying on third-party lightweight tools
Talent Support	There is an ample supply of versatile talents, and human-machine collaboration has reached a mature stage.	There is a shortage of digital and intelligent talents, and operational maintenance capabilities are weak.
Core Objective	Balancing efficiency, decision-making, and risk control equally	Support basic accounting and financial supervision

3. The core challenges in digital and intelligent financial system development for municipal higher vocational colleges

3.1. Data governance level: Weak foundation and numerous isolated systems

Compared to the well-established data platforms of foreign universities, the financial systems of domestic municipal higher vocational colleges operate independently from their academic administration, research, asset management, and logistics systems. This results in inconsistent data standards, a lack of data-sharing mechanisms, and the creation of numerous data silos. Data collection is non-standardized and insufficiently cleaned, leading to issues such as missing data, redundancy, and errors. Consequently, the data quality fails to meet the requirements for training large AI models, severely hindering the implementation of intelligent applications.

3.2. Process empowerment level: Inefficient and manual-dependent

Repetitive tasks such as expense reimbursement, voucher entry, and budget preparation remain predominantly manual, characterized by cumbersome procedures, lengthy timelines, and high error rates. Budget management is rudimentary, relying heavily on historical data and experience, with delayed execution monitoring and a lack of a closed-loop performance evaluation system. The oversight of research funds and special-purpose funds depends on manual reviews [9], posing significant compliance risks and creating a substantial gap compared to the fully intelligent management systems employed by international universities.

3.3. Resource and talent dimension: Insufficient investment and outdated capabilities

Municipal universities have limited fiscal resources, making it difficult for them to bear the substantial costs associated with deploying large AI models, system upgrades, and subsequent operations and maintenance. Most institutions lack the capacity to undertake customized development projects. Their financial staff predominantly possess traditional accounting skills but lack expertise in AI technology application, data analysis, and system operations and maintenance. There is a shortage of interdisciplinary talents capable of meeting the demands of digital and intelligent transformation, a key gap compared to international universities.

3.4. Risk control and decision-making level: Weak support and outdated management

Risk management primarily relies on post-event verification, lacking a proactive early-warning mechanism and with no application of AI-based risk control models; financial analysis remains at the level of data aggregation, lacking multidimensional in-depth analysis and trend forecasting, making it inadequate for supporting decisions on educational resource allocation [10]; supporting institutional frameworks are incomplete, with inadequate standards for digital and intelligent financial management and data security controls, failing to ensure compliant and efficient operation of AI applications.

4. Optimization pathways for AI large-model financial applications in municipal higher vocational colleges

4.1. Technical approach: Lightweight integration, phased implementation

Instead of adopting the large-scale customized deployment model used by foreign universities, the approach is tailored to the financial constraints of municipal institutions. It employs an “existing system + AI lightweight plugin” model, prioritizing integration with mature third-party lightweight large models. Pilot initiatives are launched in foundational scenarios such as reimbursement and budgeting, with gradual expansion to areas

including research funding, risk management, and decision-making once results are demonstrated. Data governance is advanced in phases: first, core system data is interconnected; subsequently, comprehensive data sharing is enhanced, thereby avoiding substantial upfront investments.

4.2. Resource allocation strategy: Multi-source financing to reduce costs

Actively seek municipal-level special funds for digital finance initiatives, integrating digital and intelligent financial management into the school's overall digital transformation plan; draw on international school-enterprise collaboration models by partnering with financial software companies and technology firms through service outsourcing and pay-as-you-go models to reduce upfront hardware and model investments; consolidate existing internal information resources to avoid redundant development and enhance resource utilization efficiency.

4.3. Talent development path: Enhancing both internal and external capabilities to address weaknesses

Drawing on the talent development mechanisms of international universities, we will establish a tiered and categorized training system for internal financial staff, offering specialized programs such as AI tool application and big data analysis tailored to different roles. This initiative accelerates the transformation of traditional accounting professionals into digitally intelligent management talents and cultivates versatile financial leaders. Concurrently, we will intensify talent recruitment efforts to attract experts in digital finance and optimize team structures. By strengthening collaborations with finance and economics institutions, we will cultivate specialized digital finance professionals aligned with the unique characteristics of municipal vocational colleges. Through a combination of internal training, external recruitment, and inter-institutional collaboration, we aim to continuously enhance the digital capabilities of our financial teams and gradually narrow the talent gap with international counterparts.

4.4. Management approach: Prioritize institutional frameworks for standardized operations

Drawing on the mature digital and intelligent financial management systems of international universities and tailored to the operational realities of municipal higher vocational institutions, we have refined comprehensive institutional frameworks for end-to-end digital financial processes. This includes enhancing digital financial management protocols, establishing detailed data security and privacy protection guidelines, and implementing access and review mechanisms for AI model applications—all with clear lifecycle management requirements for data collection, utilization, sharing, and storage. We have clarified data ownership and accountability boundaries among finance, academic affairs, research, and asset management departments, optimized cross-departmental data collaboration workflows, and established standardized, traceable human-machine collaborative operation protocols [11]. Concurrently, we have strengthened internal risk controls by deeply integrating AI-powered risk monitoring with manual review oversight, creating a dual safeguard mechanism combining technological prevention with human oversight to ensure compliant financial operations, efficient processing, and robust data security [12].

5. Conclusion and outlook

The large-scale AI models provide core technological support for the digital and intelligent financial

transformation of municipal higher vocational colleges, serving as a key pathway to address traditional financial challenges and enhance governance efficiency. Comparative analysis with foreign universities reveals that domestic municipal higher vocational colleges still lag significantly in data infrastructure, technological investment, talent resources, and application depth. However, by drawing on mature international experiences and adopting a streamlined, phased, and low-cost transformation approach, without replicating large-scale foreign models, their progress can be accelerated. The four-in-one application framework developed in this paper aligns well with the resource endowments and institutional characteristics of municipal higher vocational colleges, effectively enabling financial process automation, proactive risk prevention, and precise decision support, thereby fostering high-quality development of local vocational education.

In the future, with the continuous iteration of AI technology and the deepening of educational digitalization, the digital and intelligent finance systems in municipal higher vocational colleges will evolve toward full-scenario intelligence, deep integration of business and finance, and regional collaborative sharing. On one hand, multimodal large-scale models and blockchain technologies will be deeply integrated with financial operations to enable more precise forecasting and risk management; on the other hand, drawing on international experiences in regional institutional collaboration, a shared digital and intelligent finance platform for municipal colleges can be established to facilitate data interoperability, knowledge exchange, and resource sharing, thereby further reducing transformation costs. Subsequent research may focus on empirical analyses of specific institutional cases to optimize model adaptability, providing more refined practical guidance for AI-driven financial applications in municipal higher vocational colleges. This will advance the digital and intelligent transformation of vocational education finance in China to a higher level and contribute Chinese expertise to the global development of vocational education financial digitalization.

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