

The Impact of Digitalized Internal Control Construction on Audit Effectiveness in Small and Medium-Sized Enterprises

Jiulong Xie¹, Zihao Liu², and Xiaojun Ke^{3*}

Quanzhou University of Information Engineering, Quanzhou, Fujian 362000, China

Corresponding Author. E-mail: kexiaojun@qzuie.edu.cn^{3*}

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Abstract

In the era of the digital economy, the digital transformation of small and medium-sized enterprises (SMEs) is accelerating. The digital reconstruction of the internal control system has become a core lever for improving governance efficiency, while also profoundly changing the operational logic and performance of audit work. This paper aims to systematically sort out domestic and international scholarly outcomes concerning digitalized internal control and audit effectiveness, clarify core conceptual connotations, theoretical foundations, influencing mechanisms, situational heterogeneity and measurement approaches, identify research gaps targeting SMEs, and propose targeted future research directions for SME digital governance and audit practice. This paper systematically reviews domestic and international research findings related to digitalized internal control construction and audit effectiveness, and conducts a literature review from four dimensions: conceptual connotation, influence mechanism, situational characteristics, and measurement methods. The study finds that digitalized internal control affects audit efficiency and audit quality mainly through three paths: process automation, real-time data processing, and intelligent risk management. Due to resource constraints and governance structure characteristics, SMEs face unique dilemmas in digitalized internal control construction and audit adaptation. Existing research still has deficiencies in causal identification, boundary conditions, and SME-specific studies. Future research can further focus on the heterogeneous characteristics of SMEs, deepen the micro-mechanism of how digitalized internal control affects audit effectiveness, and expand research on the co-evolution of audit digital transformation and internal control construction.

Keywords: Digitalized Internal Control; Audit Effectiveness; Audit Quality; Audit Efficiency; Small and Medium-sized Enterprises (SMEs)

Introduction

The digital economy has become the core engine of global economic growth. The popularization and application of digital technologies such as big data, artificial intelligence, and cloud computing are profoundly reshaping enterprises' production and operation modes as well as governance logic. Enterprise digital transformation is not only a technical upgrade but also a systematic reshaping of the governance system and management and control mode. Among them, internal control, as the core institutional arrangement of corporate governance, has seen its digital reconstruction become the core direction of enterprise governance upgrading in the digital era (Wang et al., 2023). A study by Li et al. (2024) confirms that digital transformation can significantly optimize the quality of enterprise internal control, thereby promoting the improvement of total factor productivity, and this effect has been widely empirically verified at the micro-enterprise level.

As the main force of national economic and social development, SMEs play an irreplaceable role in promoting growth, ensuring employment, and invigorating the market. In Thailand, SMEs constitute the predominant component of the national business ecosystem. Historically, most Thai SMEs adopted family-oriented management models with informal internal governance and simple financial supervision mechanisms. At present, SMEs account for the vast majority of total enterprises in Thailand, contributing substantially to national GDP and domestic employment, while they differ greatly in management maturity, resource endowments and operational standardization across industries. Such large quantity and highly diversified management realities highlight the practical necessity to explore digital internal control and audit effectiveness for SME groups. However, they generally have structural shortcomings such as imperfect internal control systems, weak risk prevention and control capabilities, and insufficient investment in audit resources, which have become important bottlenecks restricting their high-quality development. An empirical study by Abouelghit & Gan (2024) based on Egyptian SMEs also finds that SME management generally has insufficient awareness of the value of internal control and auditing, and weak internal governance significantly increases operational risks and financial misstatement risks.

In recent years, digital transformation has provided an important opportunity for SMEs to make up for their shortcomings in internal control and reshape their audit work modes. On the one hand, the popularization of cloud-service-oriented digital products has reduced the implementation cost of internal control, enabling SMEs to build a standardized and process-based control system in an affordable way, breaking the resource threshold of traditional internal control (Huang et al., 2025). On the other hand, the penetration of digital audit technology is also changing the operation mode of traditional auditing. New models such as continuous auditing and big data auditing promote the transformation of audit work from sampling verification to full-volume analysis and from post-event supervision to early warning, creating technical possibilities for improving the quality and efficiency of SME auditing (Leng & Zhang, 2024). Lois et al. (2020) also point out that internal auditing in the digital era welcomes major opportunities for efficiency improvement and value expansion, but is also

accompanied by multiple challenges such as data security, talent shortage, and process adaptation, which are more prominent in resource-constrained SMEs.

Against this background, the interactive relationship between digitalized internal control construction and audit effectiveness has gradually become a hot topic of common concern in academia and practice. Existing studies have discussed it from different perspectives: Liu et al. (2025) start from the perspective of digital finance empowerment and verify the mediating role of internal control between digital finance and audit quality; Shi & Zhang (2025) proceed from the perspective of digital governance and reveal the governance effect of audit digitalization on enterprise internal control deficiencies; Zhao et al. (2023) introduce the enterprise life cycle perspective and discuss the situational boundary of how digital transformation affects the effectiveness of internal control. Overall, most existing studies take listed companies or large enterprises as the core research samples, while systematic reviews targeting the SME group are relatively insufficient. The integrated analysis of the interaction mechanism between the two in the digital context still needs to be deepened, and a complete theoretical framework adapted to the SME scenario has not yet been formed.

Based on this, focusing on the core theme of the impact of digitalized internal control construction on audit effectiveness in SMEs, this paper systematically sorts out the research results in related fields, clarifies the connotation of core concepts and theoretical foundations, analyzes the specific paths and action mechanisms of digitalized internal control affecting audit effectiveness, summarizes the differentiated characteristics and practical challenges in the SME context, and proposes future research directions on the basis of summarizing the progress and limitations of existing research, so as to provide references for the practice of digitalized governance in SMEs and the development of audit theory.

This paper adopts a narrative literature review approach. Literature materials were retrieved from mainstream academic databases including Web of Science, Scopus, CNKI and Google Scholar. Search terms included “digitalized internal control”, “audit effectiveness”, “audit quality”, “audit efficiency”, “SME”, “digital transformation”, “internal audit”. The retrieval timeframe covered publications from 2000 to 2026. Literature screening excluded non-peer-reviewed papers, conference abstracts without full text and repeated publications, and finally retained journal articles with high theoretical relevance and empirical value for collation and analysis.

Conceptual Definition and Theoretical Foundation

1. Digitalized Internal Control

Digitalized internal control is the product of the in-depth integration of digital technology and enterprise internal control systems. It is a new governance mechanism for enterprises to digitally reconstruct the five core elements of control environment, risk assessment, control activities, information and communication, and internal supervision relying on technologies such as big data, artificial intelligence, Internet of Things, and cloud computing, so as to realize automated control processes, intelligent risk identification, real-time supervision and evaluation, and transparent information transmission (Wang et al., 2023; Zhao et al., 2023). Compared with traditional internal control, digitalized internal control breaks

through the time and space limitations of manual operations, can embed control rules into business systems, realize automatic verification and trace retention of the entire transaction process, and greatly reduce the possibility of human manipulation and implementation deviations. Chen et al. (2022) further expand the value boundary of digitalized internal control, pointing out that internal control in a big data environment not only undertakes compliance control functions, but also can realize knowledge discovery and value mining of business data through integrated hybrid models, promoting the transformation of internal control from a cost center to a value creation center.

From the perspective of technological evolution, the digital development of internal control has gone through three phased leaps. The first stage is the automation germination stage, with embedded audit modules as the core representative, which realizes automatic transaction monitoring by implanting audit procedures into business information systems. Debreceeny et al. (2003) earlier discussed the development logic of embedded audit modules in the e-commerce environment, laying the technical prototype for the continuous monitoring mode. The second stage is the information integration stage, with special internal control monitoring technology as the core, which realizes automatic identification and early warning of control deficiencies by integrating data from various business systems of enterprises. The classic study by Masli et al. (2010) confirms that internal control monitoring technology can significantly improve the efficiency and effect of internal control supervision and reduce the incidence of control deficiencies. The third stage is the intelligent governance stage, supported by artificial intelligence, data mining and deep learning technologies, which realizes dynamic prediction of risks and independent optimization of control strategies. Studies by Cardoni et al. (2020) and Gökoğlan et al. (2025) both show that the artificial intelligence-assisted internal control system can realize forward-looking management and control of strategic risks and corruption risks, and greatly improve the refinement level of corporate governance. In addition, scholars have also proposed differentiated digitalized internal control frameworks for different industries and governance scenarios. For example, Ab Ghani and Saffa'Shaharuddin (2023) constructed a collaborative framework of internal control and internal audit from the perspective of Islamic auditing, further enriching the scenario-based connotation of digitalized internal control.

2. Audit Effectiveness

Audit effectiveness is a comprehensive reflection of the realization degree of audit functions and the level of value creation. Existing studies mainly carry out measurement and evaluation from two core dimensions: audit quality and audit efficiency, and gradually expand to extended dimensions such as risk prevention and control and value increment. In terms of audit quality, academia generally takes the accuracy of audit opinions, the probability of financial statement restatements, the degree of corporate earnings management, and the ability to identify major misstatement risks as proxy variables, focusing on the reliability and fairness of audit results (Liu et al., 2025; Guo et al., 2025). In terms of audit efficiency, it is usually measured by indicators such as audit delay (the issuance cycle of audit reports), audit input-output ratio, and audit resource allocation efficiency, focusing on the input-output efficiency of the audit operation process (Leng & Zhang, 2024).

With the continuous expansion of audit functions, the connotation of audit effectiveness continues to extend. Gaosong and Leping (2021) constructed a comprehensive index system of internal audit effectiveness from three levels: business process, risk management, and governance support, breaking through the limitation of a single financial dimension. Oyedotun et al. (2025) and Nadirsyah et al. (2024) proceed from the perspective of fraud governance, pointing out that fraud detection and prevention capabilities are the core yardsticks for measuring audit effectiveness, and internal audit plays an irreplaceable role in fraud prevention and control in both the public and private sectors. Fotoh and Lorentzon (2023) introduce the perspective of audit expectation gap, arguing that audit effectiveness depends not only on actual audit quality, but also on the gap between the public's audit expectations and actual audit capabilities. While digital technology narrows the traditional expectation gap, it may also give birth to new expectation gaps due to technical black boxes. In addition, for different audit subjects, the focus of audit effectiveness also differs: the effectiveness of external auditing focuses more on the quality of financial report attestation, while the effectiveness of internal auditing focuses more on risk management and governance value-added (Ndungutse & Osiemo, 2023).

3. Principal-Agent Theory

Principal-agent theory is a classic theoretical framework for explaining the relationship between internal control and auditing. Information asymmetry and agency conflicts caused by the separation of ownership and management rights in modern enterprises are the core motivations for the emergence of internal control and audit systems. Through full-process data traceability and automatic monitoring, digitalized internal control further compresses the space for management's opportunistic behavior and improves enterprise information transparency, thereby reducing auditors' information acquisition costs and audit risks (Imdieke et al., 2023). At the same time, as an external governance mechanism, independent auditing can verify and supervise the effectiveness of internal control, reversely promote the improvement of the internal control system, and form a synergistic governance effect between the two to jointly alleviate principal-agent problems. An empirical study by Pham et al. (2023) based on Vietnamese enterprises also confirms this logic, pointing out that independent auditing improves financial reporting quality by enhancing the effectiveness of internal control, and tax enforcement also plays a governance role through the internal control path.

4. Signaling Theory

Signaling theory holds that in a market environment with information asymmetry, enterprises will actively transmit positive signals to external stakeholders to show their governance quality and operating conditions, so as to gain market recognition and reduce financing costs. Huang et al. (2025) point out that enterprise digital transformation and high-quality internal control themselves are positive governance signals, which can convey to auditors the signal that enterprises have more reliable financial information and lower operational risks, thereby affecting auditors' risk assessment and resource allocation decisions. For SMEs, due to their low degree of information disclosure and weak external supervision, building a digitalized internal control system can play a more significant role in signal transmission, helping them gain the trust of auditors and reduce audit fees and audit adjustment

ranges. At the same time, standard unqualified audit opinions will reversely transmit the signal of sound internal control and reliable financial quality to the market, forming a two-way cycle of signal transmission.

5. Contingency Theory

Contingency theory emphasizes that there is no universal optimal governance model, and the design of corporate governance mechanisms must be adapted to the internal and external environment in order to exert the best effectiveness. The impact of digitalized internal control on audit effectiveness is not a simple linear relationship, but is regulated by multiple contingency factors such as enterprise life cycle, industry attributes, governance structure, and technical capabilities. Zhao et al. (2023) find that the improvement effect of digital transformation on the effectiveness of internal control has significant life cycle heterogeneity, which is more prominent in growth-stage enterprises, while the effect is relatively weakened in mature and declining enterprises. A study by Tetteh et al. (2022) on listed companies in Ghana also confirms that information technology plays a positive moderating role in the relationship between internal control systems and corporate performance, and the higher the level of information technology investment, the stronger the governance effect of internal control. This logic also applies to audit scenarios: the better the enterprise's digital foundation and the higher the maturity of internal control, the smoother the advancement of audit digital transformation, and the more significant the improvement effect on audit effectiveness.

This section defines two core concepts: digitalized internal control and audit effectiveness, and sorts out three foundational theoretical lenses for this review, namely principal-agent theory, signaling theory and contingency theory. Principal-agent theory explains the governance demand for digital internal control and auditing caused by information asymmetry; signaling theory interprets the information transfer value brought by SME digital internal control construction toward auditors and external market participants; contingency theory provides theoretical grounds for understanding heterogeneous outcomes among SMEs with different resource endowments. The above conceptual definitions and theoretical foundations jointly lay the theoretical premise for constructing the follow-up mechanism framework of how digitalized internal control acts on audit effectiveness.

Influence Mechanism of Digitalized Internal Control Construction on Audit Effectiveness

1. Audit Efficiency Improvement Path: Process Automation and Operation Intensification

Digitalized internal control significantly compresses the audit operation cycle and improves the efficiency of audit resource allocation through process automation transformation and standardized data integration. First, the digital control system realizes automatic collection, real-time synchronization and centralized storage of business data and financial data, breaking the efficiency bottleneck of cross-departmental evidence retrieval and manual data verification in traditional auditing. An empirical study by Leng & Zhang (2024) based on data of Chinese listed companies shows that for each standard deviation increase in the degree of enterprise digital transformation, audit delay is significantly shortened and audit efficiency is significantly

improved, and the digitalization degree of internal control is the core mediating variable driving this effect. Second, the integration of embedded control and continuous auditing technology promotes the transformation of audit mode from periodic post-audit to full-process real-time supervision. Bierstaker et al. (2001) earlier pointed out that the transformation of information technology on the audit process runs through the whole stages of planning, implementation and reporting, which can systematically improve audit operation efficiency. Cardoni et al. (2020) further confirm that the combination of data mining technology and continuous auditing can realize dynamic management and control of strategic risks, enabling auditors to carry out risk assessment and control tests without waiting for the end of the period, greatly improving audit response speed and coverage. Finally, the integrated internal control and audit system realizes the organic linkage of control tests and substantive procedures, reducing duplicate audit procedures. It should be noted that the above empirical evidence is mainly derived from large-sized or listed-firm samples; for resource-constrained SMEs, such efficiency gains may only materialize under the premise of effective digital system deployment and sufficient supporting talents. A study by Ndungutse and Osiemo (2023) on the public sector also confirms the positive effect of improved internal audit efficiency on organizational performance, and this mechanism has a stronger marginal effect in SME scenarios.

2. Audit Quality Improvement Path: Accurate Risk Identification and Improved Evidence Reliability

Digitalized internal control systematically improves audit quality from three dimensions: risk identification accuracy, audit evidence quality, and professional judgment support. At the level of risk identification, the intelligent internal control system can carry out anomaly detection and risk profiling based on massive transaction data, helping auditors accurately locate high-risk areas and key audit matters. A study from the perspective of digital governance by Shi and Zhang (2025) finds that audit digitalization and enterprise internal control digitalization form a synergistic effect, which can significantly inhibit the occurrence of enterprise internal control deficiencies, improve the timeliness of internal control deficiency disclosure and the thoroughness of rectification, and consolidate the institutional foundation of audit quality from the source. At the level of audit evidence, digitalized internal control improves the comprehensiveness, reliability and traceability of audit evidence. A study by Guo et al. (2025) taking the digitalization of bank confirmations as the entry point confirms that the docking of digital audit tools and enterprise internal control systems can effectively improve the efficiency and accuracy of confirmation replies, and reduce fraud risks and human intervention space in the confirmation process. A study by Liu et al. (2025) based on digital finance scenarios also points out that the development of digital finance strengthens the governance effect of enterprise internal control, and the improvement of internal control quality is further transmitted to the improvement of audit quality, with internal control playing a key mediating role between digital finance and audit quality. At the level of professional judgment support, digital tools provide multi-dimensional data support for audit decisions, but do not replace auditors' professional judgment. Mat Ridzuan et al. (2022) find that auditors' digital technology skills and professional competence are the core factors determining the effectiveness of fraud risk assessment, and the full play of the effectiveness of digitalized

internal control systems is highly dependent on auditors' technical literacy and professional judgment ability. A systematic review by Bani et al. (2025) also points out that audit digital transformation is a systematic project of technological innovation, process reconstruction and personnel capability upgrading, and the synergy of the three can ultimately realize the continuous improvement of audit quality.

3. Audit Risk Prevention and Control Path: Multi-line Defense Coordination and Closed-loop Risk Management

Digitalized internal control systematically reduces the risk of material misstatement and detection risk by constructing a full-chain risk prevention and control system of "early warning in advance-control in progress-supervision after the event". Based on existing literature synthesis, digitalized internal control is *expected to* generate risk-mitigation effects rather than producing deterministic causal outcomes. In terms of fraud risk prevention and control, a sound digital control can compress the space for fraud implementation, increase the probability of fraud detection, and reduce audit detection risk. Prasasti and Achyani (2025) confirm that the effectiveness of the internal control system plays a positive moderating role between forensic accounting, investigative auditing and fraud prevention. The higher the digitalization degree of the internal control system, the stronger its fraud prevention and control ability, and the more significant the fraud governance effect of auditing. A study by Ningsih et al. (2022) in the field of government procurement also shows that effective audit procedures and a sound government internal control system work together to significantly reduce fraud risks in the procurement of goods and services. In terms of responding to new risks, while digital transformation improves control efficiency, it also introduces new risks such as network security, data leakage, and system failures, putting forward new requirements for audit risk prevention and control.

A study by Ferreira et al. (2025) on Brazilian financial institutions points out that internal audit needs to formulate special cybersecurity control evaluation strategies to cope with new risks in the digital environment. Kurniawan and Mulyawan (2023) also emphasize that external auditors should help enterprises identify cybersecurity vulnerabilities and improve the overall level of risk protection by evaluating the soundness of internal control over financial reporting. A study by Alabdullah (2023) further points out that audit failure is highly correlated with internal control deficiencies, and audit risk prevention and control in the digital context must be based on sound digitalized internal control. In terms of compliance risk management and control, the digitalized internal control system can embed regulatory rules and compliance requirements into business processes, realize automated execution and real-time monitoring of compliance requirements, and reduce enterprise compliance risks and audit compliance costs. A study by Kholmuminovna (2025) on budget organizations proposes that a sound financial control and internal audit service system is the core guarantee for improving the level of compliance management, and this experience also has reference significance for the construction of compliance capabilities of SMEs.

4. Mechanism Framework of Digitalized Internal Control Affecting Audit Effectiveness

Based on the above analysis, digitalized internal control construction acts on audit effectiveness through three paths: efficiency improvement, quality improvement, and risk

prevention and control. Guided by principal-agent theory, signaling theory and contingency theory, this mechanism framework illustrates that digitalized internal control changes audit output by optimizing information transparency, releasing governance signals, and exerting differentiated effects under different organizational contingencies. The overall mechanism framework is shown in Figure 1:

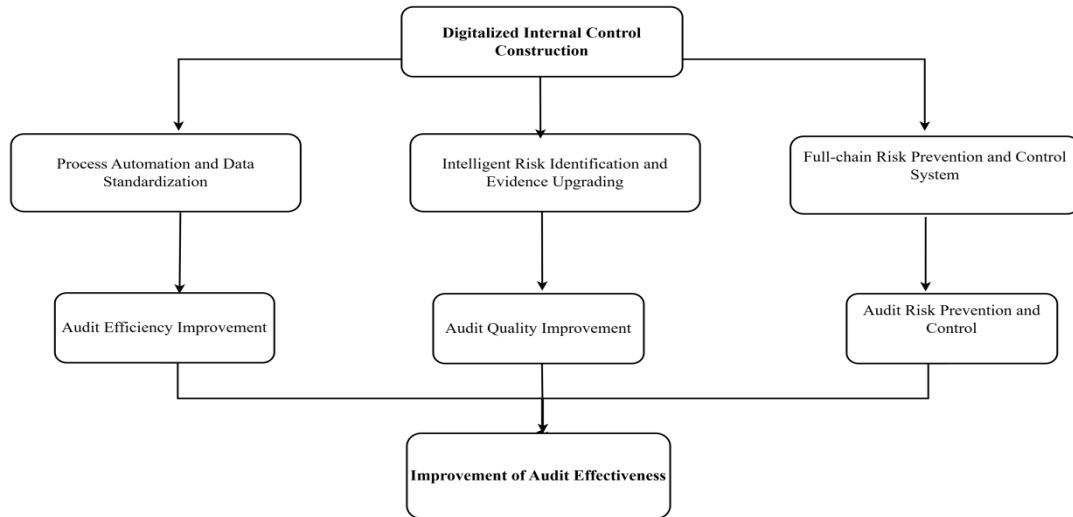


Figure 1 Mechanism Framework of Digitalized Internal Control Affecting Audit Effectiveness

Particularities and Challenges in the Context of SMEs

1. Characteristics and Practical Dilemmas of Digitalized Internal Control Construction in SMEs

The construction of digitalized internal control in SMEs presents distinct characteristics of "urgent demand, limited resources, and gradual iteration", which is significantly different from the construction path of large enterprises. From the perspective of construction foundation, SMEs generally have problems such as weak internal control foundation, imperfect systems, and inadequate implementation.

From the perspective of resource constraints, limited funds, shortage of talents, and weak technical foundation are common bottlenecks faced by SMEs in digital transformation. Compared with large enterprises, SMEs can hardly afford the high cost of digital system construction and maintenance, and also lack professional digital internal control talents. Li (2020) points out that the promotion effect of internal control effectiveness on innovation performance is more prominent in SMEs, but constrained by resources, SMEs also face greater cost pressure from digital investment. Li and Zhao (2022) further confirm that internal control can improve enterprise innovation performance by alleviating financial mismatch, and this mechanism has more practical significance for SMEs with more serious financing constraints, and digitalized internal control can further amplify this governance effect.

From the perspective of implementation path, the digitalized internal control of SMEs mostly presents gradual and scenario-based characteristics, often starting from the digitalization of core business processes and gradually expanding to full-process control.

Zhou et al. (2024) show that the promotion effect of digital transformation on enterprise innovation is regulated by both analyst attention and internal control. For SMEs with weak external supervision, digitalized internal control can replace the external supervision function to a certain extent and improve the level of corporate governance. Wang et al. (2021) also find that the effectiveness of internal control promotes technological innovation through the mediating role of corporate social responsibility, and digitalized internal control can further strengthen this transmission path, providing institutional support for the innovation and development of SMEs.

2. Structural Characteristics of Audit Work in SMEs

SME auditing faces the dual constraints of insufficient endogenous demand and limited external supply, presenting distinct structural characteristics. From the demand side, SMEs have a relatively simple governance structure, a low degree of separation of ownership and management rights, relatively mild agency problems, and weak endogenous demand for high-quality auditing. Auditing is more to meet regulatory compliance requirements rather than internal governance needs (Abouelghit & Gan, 2024). From the supply side, the audit fee level of SMEs is low, and accounting firms often invest less audit resources, making it difficult to implement complex digital audit procedures, resulting in uneven audit quality.

In terms of internal audit, the internal audit function of SMEs is generally weakened, with insufficient independence and professionalism. Many SMEs do not have an independent internal audit department, and internal audit work is mostly concurrently held by financial personnel, making it difficult for the supervision and value-added functions of auditing to be effectively exerted (Oyedotun et al., 2025). A study by Ndungutse and Osiemo (2023) on the public sector shows that the operational efficiency of internal audit directly affects organizational performance. This conclusion is transferred by analogy rather than obtained from SME-targeted empirical evidence. This conclusion also has reference significance for SMEs, and strengthening the internal audit function is an important starting point for SMEs to improve their governance level. A study by Alqudah et al. (2023) on listed service companies in Jordan also finds that empowering internal auditors can significantly improve the quality of electronic internal auditing, which provides a feasible path for SMEs to improve audit effectiveness through personnel capacity building.

In terms of external audit, SME auditing focuses more on compliance objectives, and the value-added function is insufficiently exerted. Alabdullah (2023) points out that audit failure is closely related to internal control deficiencies, and the weak control environment of SMEs increases the risk of audit failure. A study by Tao et al. (2023) expands the value boundary of auditing, confirming that internal control can significantly improve corporate environmental performance. In the digital context, auditing can promote the green transformation of SMEs by evaluating the environmental control effectiveness of internal control, so as to realize the extension of audit value.

3. Differentiated Impact of Digital Transformation on Audit Effectiveness of SMEs

Digital transformation creates a leapfrog development opportunity for SMEs to improve audit quality and efficiency, but also brings new capability gaps and adaptation challenges. On

the one hand, the popularization of lightweight digital products such as cloud auditing and SaaS-based internal control systems has lowered the entry threshold for digitalization of SMEs, enabling them to obtain standardized control and audit tools at a lower cost and achieve rapid improvement of audit capabilities (Huang et al., 2025). An empirical study by Abouelghit and Gan (2024) based on Egyptian SMEs finds that the mandatory audit system can significantly improve the quality of internal control in SMEs, and management's awareness of audit value has also improved accordingly. The application of digital tools can further strengthen this positive effect.

On the other hand, digital transformation has exacerbated the talent gap and capability shortcomings of SME auditing. Liang et al. (2025) emphasize that digital audit talents are the key factor driving audit digitalization, and the shortage of compound digital audit talents is precisely the core bottleneck faced by SMEs. Auditors find it difficult to master both digital technology and the business characteristics of SMEs, and cannot effectively evaluate the rationality and effectiveness of digitalized internal control. A study by Elsayed and Abouelela (2026) on emerging economies further shows that audit committee characteristics play a significant moderating role in the relationship between digital transformation and audit quality, while the construction of audit committees in SMEs is generally lagging behind, and imperfect governance structure further restricts the release of digital dividends.

In addition, the non-standard construction of digitalized internal control in SMEs also increases audit risks. Many SMEs lack top-level design in their digital transformation, with problems such as system fragmentation, inconsistent data standards, and inadequate security protection, which instead increase the difficulty of audit evidence collection and audit risks. Lois et al. (2020) point out that while internal auditing in the digital era welcomes opportunities for efficiency improvement, it also faces multiple risks and challenges such as data security, talent shortage, and process reconstruction, which are more prominent in resource-constrained SMEs.

Existing SME-oriented literature has formed several basic consensus: first, SMEs are constrained by capital, human resources and governance foundations when constructing digital internal controls; second, SME audit practice is constrained by insufficient internal demand and limited external service supply; third, digitalization brings both opportunities and new risks to SME audit effectiveness. Nevertheless, current empirical evidence for SMEs is still limited, most conclusions are partial or derived from cross-regional samples, and there lacks sufficient discussion on heterogeneous performance among different types of SMEs, which creates research space for follow-up exploration.

Research Review and Discussion

Existing studies have carried out multi-dimensional discussions on the interactive relationship between internal control and auditing under the background of digital transformation, and have achieved relatively fruitful research results. On the one hand, a theoretical analysis framework of internal control and audit effectiveness from the perspective of technology empowerment has been initially constructed. Scholars have verified the positive effect of internal control digitalization on audit efficiency and audit quality from different

perspectives such as digital finance, enterprise digital transformation, and audit technology innovation, revealed the basic action logic and transmission path between the two, and laid a solid theoretical foundation for follow-up research. On the other hand, the connotation boundary and measurement system of audit effectiveness have been continuously expanded. Research has gradually expanded from the traditional financial attestation dimension to multiple dimensions such as fraud prevention and control, risk governance, and value increment, and multi-dimensional audit effectiveness evaluation indicators have been developed, enriching the evaluation paradigm of audit effectiveness. In addition, existing research has accumulated multiple empirical evidence covering different countries, different industries, and different property rights, providing multi-scenario empirical support for understanding the relationship between digitalized internal control and audit effectiveness.

At the same time, existing research still has three obvious limitations. First, there is a lack of specialized research targeting the SME group. Most literatures take listed companies or large enterprises as research samples, pay insufficient attention to the unique path of digitalized internal control construction and audit adaptation mode under the resource constraints of SMEs, and the applicability and guidance of research conclusions to SMEs need to be tested. Second, the micro-path analysis of the influence mechanism is not in-depth. Most existing studies focus on the verification of the direct relationship between the two, and the analysis of specific transmission paths, boundary conditions and micro-action mechanisms of digitalized internal control affecting audit effectiveness is not sufficient, lacking refined research that opens the "black box" of action. Third, research on two-way interaction and co-evolution is insufficient. Most existing studies focus on the one-way impact of internal control digitalization on auditing, and there are few discussions on how audit digital transformation reversely promotes internal control optimization and how the two co-evolve, which is difficult to respond to the practical demand of integrated construction in practice.

The relationship between digitalized internal control and audit effectiveness is not a simple one-way causal relationship, but presents dynamic characteristics of two-way interaction and collaborative evolution. From the perspective of practical logic, the digital upgrading of enterprise internal control provides data foundation and system support for audit digital transformation, and promotes the systematic reform of audit methods, audit processes and audit modes; in turn, the upgrading of audit standards, the innovation of audit technology and the strengthening of audit supervision will also put forward higher requirements for enterprise internal control construction, forcing enterprises to continuously optimize the digitalized internal control system. Most existing studies focus on the verification of one-way impact, and the discussion on this two-way interactive relationship is not sufficient. In the future, more studies from a dynamic perspective are needed to reveal the co-evolution law of the two.

The interaction between digitalized internal control and auditing in the SME scenario has significant "threshold effect" and "paradox characteristics". On the one hand, the popularization of lightweight digital tools has lowered the entry threshold for digitalization of SMEs, enabling them to obtain standardized internal control and audit tools at a lower cost and achieve leapfrog improvement of audit effectiveness; on the other hand, digital construction

requires continuous capital investment, talent support and technical maintenance. The common problems of SMEs such as resource constraints, talent shortage and insufficient technical capabilities may weaken the governance effect of digitalized internal control, and even give birth to new audit risks due to non-standard system construction and inadequate data management. This means that the construction of digitalized internal control and the improvement of audit effectiveness in SMEs need to explore differentiated paths adapted to their own resource endowments, rather than blindly copying the models of large enterprises.

Conclusion and Future Prospect

Under the background of the digital economy, the construction of digitalized internal control has become the core driving force for promoting the quality and efficiency improvement of audit work. Overall, digitalized internal control is likely to improve audit efficiency through process automation and operation intensification, may improve audit quality through accurate risk identification and upgraded evidence quality, and strengthens audit risk prevention and control through multi-line defense coordination and closed-loop management, systematically improving audit effectiveness from multiple dimensions; however, this action process is regulated by multiple factors such as enterprise scale, development stage, technical capability and governance structure, and SMEs show significant heterogeneous performance due to resource constraints and governance characteristics. Existing research has made important progress in theoretical framework construction, empirical relationship verification and scenario expansion, but there are still obvious deficiencies in SME-specific research, micro-transmission mechanism analysis and co-evolution discussion of the two. Follow-up research needs to further respond to practical needs and improve the relevant theoretical system.

Future research can be deepened from three directions: first, focus on the heterogeneous characteristics of SMEs, deeply discuss the construction mode of lightweight digitalized internal control and audit adaptation path under resource constraints, analyze the differentiated performance of SMEs in different industries and different development stages, and construct a collaborative framework of digitalized internal control and auditing adapted to SMEs; second, deepen the research on micro-transmission mechanisms, start from micro-perspectives such as audit resource allocation, audit procedure reconstruction, and auditors' behavioral decision-making, open the process black box of how digitalized internal control affects audit effectiveness, and reveal the underlying logic of technology-enabled auditing; third, expand research on co-evolution and long-term effects, pay attention to the two-way interactive relationship and dynamic evolution law of digitalized internal control and audit digitalization, track the long-term impact and potential risks of emerging technology applications, and provide more targeted theoretical support and practical guidance for the digitalized governance of SMEs and the high-quality development of auditing.

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