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The Impact of Digital Transformation on Financing Constraints

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Abstract

In the era of the digital economy, the digital transformation of enterprises has a profound impact on their financing capabilities. By comprehensively reviewing relevant studies, this paper clarifies the concepts of digital transformation and financing constraints, and focuses on analyzing their impact mechanisms. Research indicates that digital transformation primarily alleviates financing constraints by mitigating information asymmetry, enhancing enterprise performance and competitiveness, improving corporate governance, and broadening financing channels. However, its high initial investments may also exacerbate funding pressures in the short term. This article summarizes the consensus and divergences in existing research, and proposes measures from four perspectives: enterprises, government, financial institutions, and society, to assist enterprises in addressing financing challenges during the transformation process, thereby providing theoretical foundations and practical guidance for future studies.

Keywords

digital transformation, financing constraints, information asymmetry, digital finance

1. Introduction

With the rapid development of information technology, the wave of digitalization has swept across the globe, making digital transformation an essential choice for the survival and development of enterprises. The implementation of digital transformation involves changes in various aspects such as business processes, organizational structures, and business models, which can enhance enterprises' operational efficiency, innovation capabilities, and market competitiveness. However, enterprises often encounter financing constraints during their development process, that is, the inability to obtain sufficient funding support at reasonable costs, which significantly restricts their investments, research and development, and expansion(Liu et al., 2025).

In recent years, numerous scholars have begun to pay attention to the impact of digital transformation on enterprises' financing constraints. Some studies indicate that digital transformation can alleviate these constraints, while others draw different conclusions. For instance, certain research finds that in the early stages of digital transformation, enterprises must invest substantial funds in technology research and development, equipment upgrades, and other areas, which may exacerbate financing constraints in the short term. These divergent conclusions arise from differences in research contexts, the stages of enterprises involved, and measurement methods, rather than fundamental contradictions (Chen et al., 2025). Systematically reviewing relevant studies can provide a more comprehensive understanding of the dual

impacts of digital transformation on financing constraints. Therefore, systematically organizing research on digital transformation and financing constraints, clarifying the relationship between the two, and elucidating their impact mechanisms hold significant theoretical and practical implications for deeply understanding the economic consequences of digital transformation and addressing enterprises' financing challenges. The purpose of this paper is to analyze existing studies and provide references for future research.

The structure of this paper is as follows: it first defines the concepts of digital transformation and financing constraints to lay the foundation for subsequent analysis; it then focuses on exploring the mechanisms through which digital transformation affects financing constraints; it proposes coping strategies from multiple perspectives; and finally, it summarizes the research conclusions and points out directions for future research.

2. Conceptual Definition of Digital Transformation and Financing Constraints

2.1 Digital Transformation

Digital transformation refers to the process by which enterprises leverage digital technologies, such as big data, cloud computing, artificial intelligence, and others, to comprehensively reshape their business models, organizational structures, and operational processes, thereby achieving value creation and sustainable development (Zhang and Cong, 2025). Its core connotations can be understood from three dimensions: technological application, business innovation, and organizational change. In terms of technology, it involves treating data as a key production element and applying it deeply; in terms of business, it manifests as digital innovation in products, services, and business models; and in terms of organization, it requires building management structures and cultures that adapt to the digital era.

2.2 Financing Constraints

Financing constraints originate from information asymmetry theory, which posits that differences in internal and external information lead external investors to demand a risk premium, thereby causing enterprises to face constraints such as excessively high financing costs or insufficient availability of funds. Common measurement indicators include investment-cash flow sensitivity, the KZ index, and the WW index, which reflect from different perspectives the degree of enterprises' reliance on internal financing and the difficulty of external financing.

2.3 Theoretical Foundation

The theoretical foundation for the impact of digital transformation on financing constraints is built upon a progressively layered logical chain. Information asymmetry theory reveals the root cause of financing constraints, positing that there exists an information gap between internal enterprise personnel and external investors, leading to adverse selection and moral hazard, which in turn generate financing constraints. Therefore, digital transformation, by enhancing information transparency and quality, becomes a key method to reduce such asymmetry (Li et al., 2025). Subsequently, signaling theory explains how digital transformation serves as a powerful signal to address the aforementioned information issues. The active engagement of enterprises in digital transformation conveys positive information to the market about their innovative potential, advanced management, and promising future prospects. This information helps enterprises stand out among peers, attract investor attention, and reduce the risk premium and costs of external financing. Moreover, the resource-based view supports the long-term effectiveness of the above information and the fundamental improvement in financing capabilities from the perspective of internal capability building. It argues that digital capabilities have become a valuable and hard-to-imitate strategic resource for enterprises, which can enhance operational efficiency, innovation levels, and sustainable competitive advantages, thereby improving financial performance and fundamentals, fundamentally strengthening profitability and risk resistance, and making the "high-quality" information conveyed by enterprises authentic and reliable.

In summary, digital transformation alleviates enterprises' financing constraints systematically and multi-dimensionally through this composite mechanism.

3. The Impact Mechanisms of Digital Transformation on Financing Constraints

3.1 Alleviating Information Asymmetry

3.1.1 Enhancing Information Transparency

Digital transformation, by reconstructing the modes of corporate information disclosure and transmission, can effectively break down information barriers in traditional financing, significantly improving the transparency of information. In traditional models, enterprises and funding parties often face cognitive gaps due to fragmented information and untimely disclosures, making it difficult for funding parties to fully understand the true operational conditions of enterprises. This leads to heightened financing standards due to the risks of information inaccuracy.

After completing digital transformation, enterprises leverage integrated digital management systems to convert key data from production, finance, operations, and other areas into structured digital assets, establishing an information pool that covers all dimensions of "operations-management-finance". A prime example is Ant Group, which relies on its robust digital technology platform and utilizes MYbank to provide credit loans to small and micro enterprises. MYbank employs transaction data from enterprises within the Alibaba ecosystem to construct multi-dimensional enterprise credit profiles, thereby greatly enhancing information transparency. Compared to the traditional banking model that relies on financial statements, this credit evaluation method based on real-time operational data enables many small and micro enterprises that previously struggled to obtain financing to successfully secure loans, markedly alleviating their financing challenges.

3.1.2 Reducing Information Acquisition Costs

Digital transformation reduces costs across the entire chain of information collection, processing, and transmission, thereby dismantling cost barriers in financing connections. In traditional financing, funding parties must invest substantial manpower in offline due diligence investigations, while enterprises expend resources to compile materials, resulting in high information communication costs for both sides.

Following digital transformation, funding parties can directly access standardized information through corporate digital platforms and industry data terminals, eliminating the need for repeated offline surveys and shortening the collection cycle. Big data tools can automatically classify and analyze data, reducing processing costs. For enterprises, digital systems can automatically generate compliant information reports, avoiding the need for repeated adjustments to materials. As a result, information acquisition costs for both parties decrease, financing connection efficiency improves, and funding parties become more willing to participate in enterprise financing, effectively alleviating financing constraints.

3.2 Enhancing Enterprise Performance and Competitiveness

3.2.1 Improving Operational Efficiency

Digital transformation drives innovation in enterprise operational models, significantly enhancing operational efficiency. Through advanced digital technologies, enterprises can build integrated information management systems that break down information barriers between departments, enabling real-time sharing and collaborative operations of data across production, sales, inventory, and other links. In the production phase, technologies such as sensors and the Internet of Things (IoT) monitor equipment operating conditions in real time, accurately predicting equipment failures based on data to schedule maintenance in advance, thereby reducing downtime and improving equipment utilization rates. In sales, digital marketing tools can precisely target customer needs, respond quickly to orders, optimize delivery processes, and shorten product delivery times(He et al., 2025). Inventory management leverages big data analytics to achieve precise restocking, avoiding overstocking or shortages, and reducing inventory costs. Overall, with closely interconnected links and increased automation in processes, labor costs are reduced, resource allocation becomes more efficient, and operational efficiency improves substantially. This grants enterprises time and cost advantages in the market, laying a solid foundation for alleviating financing constraints.

3.2.2 Enhancing Innovation Capabilities

Digital transformation provides powerful impetus to enterprise innovation. Digital tools enable enterprises to efficiently integrate global innovation resources, facilitating online collaborations with universities, research institutions, and upstream and downstream industry partners, thereby breaking geographical and organizational barriers to access diverse technologies and ideas. Big data and artificial intelligence help enterprises deeply understand market trends and precisely capture latent customer demands, ensuring innovation directions align closely with market needs and avoiding blind investments. Internally, digital R&D platforms support innovative approaches such as virtual simulations and rapid iterations, reducing trial-and-error costs in research and development and accelerating the innovation speed of products and services. For example, Tesla utilizes digital tools for product design and R&D, continuously optimizing the performance of its electric vehicles and energy products through virtual simulations, big data analytics, and machine learning. At the same time, Tesla collaborates with global suppliers and R&D institutions via digital platforms, substantially shortening product development cycles and launching market-competitive innovative products ahead of competitors, such as the "Autopilot" autonomous driving system. This sustained innovation capability not only enhances enterprise profitability but also strengthens its financing capacity in the capital market. The open environment fostered by digitalization encourages employees to propose innovative ideas, establishes innovation incentive mechanisms, and stimulates organization-wide innovation vitality. The elevation of innovation capabilities enables enterprises to continuously introduce differentiated products and services, explore new markets, enhance profitability and risk resistance, and become more attractive in the financing market, effectively alleviating financing challenges.

3.3 Optimizing Corporate Governance Structure

3.3.1 Enhancing Management Transparency and Standardization

Digital transformation reshapes enterprise management processes, comprehensively improving the transparency and standardization of management. Enterprises leverage digital management systems to transform various management processes, such as approvals, decision-making, and expense reimbursements, into standardized and automated modules. Each process step leaves a traceable record in the system, enabling full traceability of operations, clear delineation of responsibilities, and avoidance of human arbitrariness and opaque dealings. Information within the enterprise is shared through digital platforms on a tiered permission basis, allowing management to monitor departmental operations in real time while employees gain clarity on their workflows and standards. External stakeholders, such as investors and creditors, can access key corporate governance information, such as financial reports and progress on major decisions, through compliant channels. Standardized management reduces operational risks, enhances trust in corporate governance among all parties, and reassures funding providers, making them more willing to offer financing support and thereby alleviating enterprises' financing constraints.

3.3.2 Optimizing Equity Structure

Digital transformation creates opportunities for enterprises to optimize their equity structures. Digitalization broadens channels for brand dissemination and resource connections, elevating enterprises' market influence and development potential, which in turn attracts strategic investors possessing industry resources and advanced technologies. These strategic investors not only bring capital upon entering the enterprise but also leverage their strengths to help expand business and upgrade technologies, diluting overly concentrated equity holdings and forming a pattern of diversified equity with mutual checks and balances. This prevents single shareholders from dominating decisions, reducing decision-making risks. At the same time, digital platforms enable enterprises to pursue new financing avenues such as equity crowdfunding and online private placements, drawing in numerous small and medium-sized investors to promote moderate equity dispersion and enrich the shareholder composition. For instance, Xiaomi has utilized digital platforms to implement equity crowdfunding and employee stock ownership plans, achieving moderate diversification and decentralization of its equity structure. This not only ensures the founding team's control but also introduces diverse resources and oversight, optimizing corporate governance and enhancing financing capabilities.

3.4 Expanding Financing Channels

3.4.1 Utilizing Digital Financial Platforms

Digital transformation assists enterprises in connecting with diversified digital financial platforms, breaking through the limitations of traditional financing. Digital financial platforms such as internet banks, supply chain finance platforms, equity crowdfunding platforms, and digital bond markets are developing vigorously, significantly broadening enterprises' financing pathways. For example, JD Technology's "Jingpiao Second-Post" platform leverages blockchain and big data technologies to achieve "second-level discounting" of bills of exchange. This service based on digital financial platforms enables small and medium-sized enterprises to quickly obtain working capital, greatly alleviating the funding shortages under traditional financing channels. These platforms revolutionize enterprise credit assessment methods through technologies like big data and blockchain, no longer relying solely on financial statements but instead comprehensively evaluating credit based on multi-dimensional data such as transaction flows, tax records, supply chain positions, and industry reputation. Internet banks issue small-amount credit loans based on enterprises' online transaction data, with simple and rapid processes. Equity crowdfunding platforms allow enterprises to raise funds from the public, quickly aggregating idle social capital. With characteristics of low thresholds, broad coverage, and high efficiency, digital financial platforms effectively alleviate enterprises' financing constraints due to insufficient collateral.

3.4.2 Engaging in Supply Chain Finance

Digital transformation enables enterprises to deeply integrate into supply chain finance, relying on industry chain collaboration to expand financing channels. In traditional supply chains, SMEs face significant financing difficulties due to poor credit and limited collateral, which hinders the overall capital flow within the supply chain. Digital transformation reverses this situation. Core enterprises utilize digital platforms to integrate full-process data from the supply chain, gaining insights into upstream and downstream enterprises' orders, inventories, deliveries, and other aspects, thereby providing credit endorsements for SMEs. Gree Electric, as a core enterprise in the home appliance industry, integrates logistics, capital flows, and information flows through digital platforms, incorporating its upstream suppliers and downstream distributors into a unified management platform. Financial institutions, based on Gree's digital supply chain data, provide financing services to small and medium-sized suppliers grounded in orders and accounts receivable. This model, relying on authentic industry chain transactions and the credit of core enterprises, effectively breaks through traditional financing bottlenecks, enhances the efficiency of capital operations across the entire chain, and alleviates the financing pressures on SMEs.

4. Measures for the Impact of Digital Transformation on Financing Constraints

4.1 Enterprise Level

4.1.1 Formulating Rational Digital Transformation Strategies

Enterprises should formulate clear digital transformation strategies based on their actual conditions and development needs, specifying transformation objectives, pathways, and steps, and rationally planning digital investments to avoid blind conformity. Moreover, they should strengthen the management and monitoring of the digital transformation process, timely adjusting strategies and tactics to ensure smooth implementation. For example, enterprises can establish dedicated digital transformation teams responsible for formulating and executing strategies, and regularly evaluating transformation outcomes.

4.1.2 Strengthening Research, Development, and Application of Digital Technologies

Enterprises need to increase funding for digital technology R&D, attract and cultivate digital talents to elevate their own digital technology levels, and proactively apply advanced technologies such as big data, cloud computing, and artificial intelligence to optimize business processes, thereby enhancing operational efficiency and innovation capabilities. At the same time, they should strengthen collaborations with universities and research institutions to jointly undertake R&D and application projects for digital technologies, promoting the widespread adoption and application of digital technologies in enterprises(Fu et al., 2025).

4.2 Government Level

4.2.1 Improving Digital Infrastructure Construction

The government should increase investment in new infrastructure such as 5G base stations, industrial internet, and data centers, focusing on covering enterprise clusters like industrial parks and industry agglomerations. For instance, in the Yangtze River Delta manufacturing agglomeration, promote the "5G+ Industrial Internet" integration application projects to provide enterprises with high-speed and stable network support. At the same time, promote interconnection of cross-regional digital infrastructure, break down data barriers, build a nationwide integrated data-sharing platform, and establish an infrastructure security assurance system to prevent cyber attacks and data leakage risks. For example, formulate regulations on the security protection of critical information infrastructure and conduct regular security inspections. By improving digital infrastructure, reduce the technical difficulties and costs of enterprises' digital transformation, laying a hardware foundation for alleviating enterprises' financing constraints.

4.2.2 Issuing Policies to Support Enterprises' Digital Transformation

Tailor differentiated policies for enterprises of different scales. For SMEs, implement digital transformation subsidies, refunding a certain proportion of digital investments to reduce transformation costs. Establish special funds for digital transformation to support enterprises in technology R&D and equipment upgrades, adopting a "government guidance + social capital participation" model to expand funding scale and support technology R&D and equipment updates. In terms of taxation, provide VAT exemptions for enterprises purchasing digital equipment and software, and implement incremental deductions for R&D expenses related to transformation. At the same time, build a digital transformation evaluation system, rewarding enterprises with significant achievements to create demonstration effects, stimulate enterprises' enthusiasm for transformation, and optimize the financing environment(Wang et al., 2025).

4.3 Financial Institutions Level

4.3.1 Innovating Financial Products and Services

Centering on enterprises' digital transformation, promote innovation in full-process financial products. In the early stage of transformation, launch "digital equipment installment loans" to support enterprises in phased payments for equipment purchases; in the mid-stage, provide "data asset pledge loans", using anonymized data and algorithm models as collateral. At the same time, leverage blockchain technology to build supply chain finance platforms, achieving digital confirmation and circulation of accounts receivable. For example, Ping An Bank launched the "Xingyun IoT Platform", which collects enterprise production and operation data through IoT devices, monitors the status of collateral and enterprise operations in real time, and on this basis, introduces "IoT finance" products, such as equipment financing based on device operation data and movable asset financing based on storage data. Such innovative financial products effectively address information asymmetry in traditional financing, providing SMEs with more flexible financing channels.

4.3.2 Strengthening Cooperation with Enterprises

Establish regular bank-enterprise communication mechanisms, where financial institutions dispatch "digital financial advisors" to enterprises to accurately grasp their transformation plans and funding needs, tailoring personalized financing solutions. Both parties jointly build data-sharing platforms; under the premise of ensuring data security, enterprises open operational data to financial institutions, and financial institutions use data analysis to provide precise credit granting to enterprises. For example, China Construction Bank collaborates with numerous small and medium-sized merchants through its own platform "Jianhang Life", obtains authentic transaction data, and launches customized credit loan products such as "Merchant Cloud Loan", achieving efficient approval and disbursement. This deep bank-enterprise cooperation model not only improves financing efficiency but also enhances banks' risk control capabilities for micro and small enterprises.

4.4 Social Level

4.4.1 Strengthening Digital Talent Cultivation

Universities should optimize discipline settings, add cutting-edge majors such as artificial intelligence and big data management, increase the proportion of practical teaching, and jointly build training bases with enterprises to cultivate talents proficient in both theory and practice. Vocational training institutions should offer "digital skills crash courses", conducting short-term training in cloud computing, data analysis, etc., and issuing industry-recognized certificates. The government should set up special subsidies for digital talents, providing settlement allowances, children's education benefits, and other incentives for introduced high-end digital talents, and subsidizing enterprises for employee digital training. Through multiple channels to cultivate and attract talents, address the talent shortage in enterprises' digital transformation, providing human resource support for enterprises to enhance their financing capabilities.

4.4.2 Promoting Innovation and Application of Digital Technologies

Support industry associations in leading the establishment of "Digital Transformation Alliances", integrating resources from enterprises, research institutions, and universities to collaboratively tackle key generic technologies and develop low-cost digital solutions suitable for SMEs. Hold activities such as digital technology expos and innovation competitions to showcase cutting-edge technological achievements and promote technology exchange and cooperation. Establish digital technology promotion centers to provide enterprises with technical consulting and solution design, assisting traditional enterprises in rapidly applying digital technologies, for example, recommending suitable industrial software and intelligent transformation schemes for manufacturing enterprises. By promoting technological innovation and dissemination, enhance enterprises' digitalization level and competitiveness in financing.

5. Conclusion

Digital transformation, as a key trend in enterprise development, holds significant importance for alleviating financing constraints. It exerts positive effects on enterprise financing by mitigating information asymmetry, enhancing enterprise performance and competitiveness, improving corporate governance structures, and expanding financing channels. However, during the digital transformation process, enterprises may also encounter certain challenges, such as insufficient digital investments and a shortage of digital talents, which could potentially affect the effectiveness of digital transformation in alleviating financing constraints.

To more fully leverage the role of digital transformation in mitigating financing constraints, enterprises should formulate rational digital transformation strategies and strengthen the research, development, and application of digital technologies; the government should improve digital infrastructure construction and introduce policies to support enterprises' digital transformation; financial institutions should innovate financial products and services while enhancing collaboration with enterprises; and all sectors of society should intensify the cultivation of digital talents and promote the innovation and application of digital technologies.

This study also has certain limitations. Existing research is mostly based on macro or industry levels, lacking in-depth analysis of micro-level mechanisms at the enterprise level, and insufficient exploration of the heterogeneous impacts of digital transformation on enterprises of different types and stages. Moreover, the measurement indicators for digital transformation and financing constraints have not yet been unified, which may affect the accuracy of research results.

Future research should further refine relevant theories and methods, delving deeper into the relationship between digital transformation and financing constraints, providing stronger theoretical support and practical guidance for enterprises in formulating digital transformation strategies and alleviating financing constraints(Li and Zhang, 2025). All parties should collaborate to jointly promote enterprises' digital transformation, optimize financing conditions, and facilitate the healthy development of enterprises.

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