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Research on the Influence of Digital Transformation on the High-Quality Development of Enterprises

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Abstract: In recent years, China's digital economy has developed rapidly, and the digital transformation of enterprises has become an inevitable trend. This paper takes A-share listed companies in China from 2010 to 2023 as the research sample, using total factor productivity as a basis to measure the high-quality development of enterprises. A benchmark regression model is constructed, and two mediating variables, management efficiency and financing capability, are introduced. The analysis uses OLS (Ordinary Least Squares) regression and mediation effect tests to explore the internal mechanisms by which digital transformation enhances total factor productivity in enterprises. The research shows that digital transformation can significantly promote the high-quality development of enterprises. Mechanism tests reveal that management efficiency and financing capability play mediating roles in the process of digital transformation driving high-quality development. Finally, relevant feasible suggestions are proposed with the aim of providing experience and insights to support the digital transformation of enterprises in China and promote their high-quality development.

Keywords: Digital Transformation; High-Quality Development; Total Factor Productivity; Management Efficiency; Financing Capacity

1. Introduction

China's digital economy has witnessed remarkable growth, marked by the rapid expansion of digital infrastructure such as 5G networks, fiber-optic broadband, and mobile IoT. These advancements have broadened their application scenarios, driving the nation's total computing power to an impressive 230 EFLOPS, securing a global second-place ranking. The 2024 Government Work Report emphasizes accelerating digital transformation in manufacturing and advancing industrial Internet adoption. In alignment with this vision, local governments have implemented supportive measures aimed at fostering economic and social progress, generating momentum for high-quality development. These initiatives highlight the integral role of digital transformation in the national strategy, signaling a rapid increase in enterprise digitalization efforts. As businesses integrate digital technologies into their operations, they are not only modernizing production but also propelling high-quality development [1].

Digital transformation has become a prominent subject in both domestic and international research. It is defined as leveraging digital technologies to optimize resources such as talent, capital, and technology, enabling innovation in production methods and improving efficiency. At a macroeconomic level, digital innovation drives high-quality development by facilitating industrial upgrades and improving resource allocation [2]. At a micro level, it enhances supply chain integration, boosts specialization, and improves coordination, leading to more efficient resource use and better business performance [3]. Digital transformation also contributes to total factor productivity by optimizing capital allocation and reducing transaction costs, which helps expand export scales. Furthermore, adopting information technology mitigates information asymmetries and reduces auditing costs, improving operational efficiency through innovative processes, resource optimization, and cost reduction.

Existing literature predominantly focuses on how digital transformation impacts new business models, industrial upgrades, and

innovation capabilities. However, gaps remain in understanding how it influences enterprise financing and management efficiencies. This study addresses these gaps by analyzing a sample of A-share listed companies in China from 2010 to 2023. It explores how digital transformation impacts total factor productivity. The paper's contributions include examining pathways through which digital transformation fosters high-quality development, utilizing a larger dataset for robust findings, and providing insights into how enterprise characteristics shape outcomes, offering policy recommendations for stakeholders.

2. Research Hypotheses

2.1 Theoretical Analysis of Direct Influence

Enterprise digital transformation plays a pivotal role in strengthening competitiveness, enabling firms to adapt effectively to fast-evolving market dynamics, enhance efficiency, lower costs, and achieve long-term economic sustainability. By streamlining operations, digital transformation boosts total factor productivity and fosters high-quality development.

Firstly, adopting digital technologies allows enterprises to optimize internal processes, minimize reliance on manual labor, and implement intelligent automation, thereby enhancing operational efficiency. Many organizations undergoing digital transformation have integrated systems such as Enterprise Resource Planning (ERP) and supply chain management tools, which enable real-time monitoring of production, sales, and inventory. These advancements support more accurate and timely decision-making, directly improving economic outcomes. Moreover, e-commerce platforms enable businesses to reduce transaction costs by eliminating intermediaries, lowering procurement and sales expenses.

Secondly, digital transformation acts as a catalyst for technological innovation, which significantly contributes to higher total factor productivity. It accelerates research and development (R&D) processes and fosters innovation efficiency[4]. Additionally, the adoption of new business models driven by digital technologies creates favorable conditions for technological progress. These models introduce novel market opportunities and intensify competition, encouraging continuous innovation and bolstering an enterprise's competitive advantage.

Hypothesis 1: Digital transformation positively impacts the high-quality development of enterprises.

2.2 The theoretical analysis of the Mediating Mechanisms

Previous studies suggest that this development is primarily driven by improvements in operational efficiency, cost optimization, innovation enhancement, risk management, and capital allocation. This research further identifies two critical mediating mechanisms: enhanced management efficiency and improved financing capacity. By adopting advanced digital technologies, enterprises can streamline management processes, facilitate faster information exchange, and support more informed decision-making. These enhancements contribute to improving management efficiency, ultimately fostering high-quality development. For instance, digital transformation often involves the use of performance management systems, enabling accurate and objective evaluation of employee contributions, which can boost productivity. Similarly, integrating digital supply chain systems ensures real-time supplier monitoring, improving the stability and reliability of supply chains. Traditional enterprise management often struggles with delays and inaccuracies in information flow, which can hinder timely decision-making. Digital platforms address these issues by enabling quick cross-departmental communication, removing information silos, and fostering real-time collaboration via online tools. Such improvements significantly enhance information sharing and productivity [5].

Hypothesis 2: Digital transformation facilitates high-quality enterprise development by enhancing management efficiency.

Additionally, digital transformation helps alleviate financing constraints and enhances financial capability, further promoting high-quality development. Enterprises can leverage big data and cloud computing to merge internal and external data resources, ensuring real-time sharing and precise analysis. This reduces information asymmetry and improves access to financing[6]. Digital

transformation also diversifies financing channels by introducing innovative models like internet financial platforms and supply chain financing. These advancements improve corporate credit ratings, mitigate risks, and reduce financing costs. Improved financing capabilities enable greater investments in research and development, advanced technologies, and talent acquisition. Such investments enhance the technical sophistication and value of products, driving total factor productivity. Furthermore, enhanced financial capabilities facilitate technological upgrades and process optimization, promoting coordinated resource allocation and efficient development[7].

Hypothesis 3: Digital transformation promotes high-quality development through improved enterprise financing capacity.

3. Research Design

3.1 Variable Selection

(1) Dependent Variable. The total factor productivity (TFP) of enterprises is used as a proxy variable for the high - quality development of enterprises. In this study, the TFP is calculated using the LP semi-parametric estimation method.

(2) Independent Variable. The enterprise digital transformation index (Dig) is constructed using text analysis methods[1].

(3) Mediating Variables. Management Efficiency (ME): This variable is measured by the ratio of main business income to management expenses. It reflects the degree to which digital transformation fosters innovation in management processes. Management efficiency thus captures how effectively digitalization enhances operational processes within enterprises. Financing Capacity (indexSA): This variable is assessed using the financing constraint index, a widely recognized measure of an enterprise's ability to access financing. The calculation methodology is based on studies by Zhang Tongbin and Liu Wenlong (2024) [8].

(4) Control Variables

Age: Enterprise listing age; Stock: Whether it is state-owned holding; Income: Logarithm of total operating revenue; Liquid: Current assets divided by current liabilities; Lev: Total corporate liabilities divided by assets; Mexpenses: Logarithm of management expenses; TOP1: The number of shares held by the largest shareholder divided by the total number of shares; Cflow: Net cash flow, which is sales revenue minus cash costs minus income tax; TobinQ: Tobin's Q.

3.2 Model Setting

To examine the effects of digital transformation on the high-quality development of enterprises and investigate the underlying mechanisms, the following baseline regression model is established:

$$TFP_{it} = \alpha_0 + \alpha_1 Dig_{it} + \alpha_j Controls_{it} + \sum Year + \sum Industry + \varepsilon_{it} \quad (1)$$

A significantly positive α_1 would indicate that digital transformation enhances enterprise performance, as measured by total factor productivity, thereby supporting high-quality development.

To explore the mechanisms through which digital transformation influences high-quality development, two mediating variables are introduced: management efficiency (ME) and financing capacity (indexSA). These allow for an investigation of whether improvements in management innovation and financing capacity mediate the effects of digital transformation. The models are defined as follows:

$$\mathrm{ME}_{it} = \beta_0 + \beta_1 \mathrm{Dig}_{it} + \beta_j Controls_{it} + \sum Year + \sum Industry + \varepsilon_{it} \quad (2)$$

$$TFP_{it} = \gamma_0 + \gamma' Dig_{it} + \gamma_1 \mathrm{ME}_{it} + \gamma_j Controls_{it} + \sum Year + \sum Industry + \varepsilon_{it} \quad (3)$$

$$\mathrm{indexSA}_{it} = \mu_0 + \mu_1 \mathrm{Dig}_{it} + \mu_j Controls_{it} + \sum Year + \sum Industry + \varepsilon_{it} \quad (4)$$

$$\mathrm{TFP}_{it} = \sigma_0 + \sigma' Dig_{it} + \sigma_1 \mathrm{indexSA}_{it} + \sigma_j Controls_{it} + \sum Year + \sum Industry + \varepsilon_{it} \quad (5)$$

3.3 Sample Selection and Data Sources

This research focuses on A-share listed

companies in China, spanning from 2010 to 2023. The initial data processing and merging were carried out using Excel and Stata software. To improve the robustness and accuracy of the results, additional data cleaning was applied. Missing data were handled through interpolation techniques, and firms with specific conditions—such as those marked as ST, ST* (delisting risk), or PC (suspended)—were excluded from the analysis. Observations with missing values or extreme outliers were removed, and extreme values were adjusted through logarithmic transformation. After data refinement, a total of 40,684 valid observations were used for the final analysis.

Table 1. Benchmark Regression Results

	(1) TFP	(2) TFP
Dig	0.175***(33.42)	0.033***(13.27)
Age		0.002***(4.12)
Stock		-0.018***(-2.82)
Income		1.872***(244.22)
Liquid		0.011***(15.20)
Lev		0.031***(12.53)
Mexpenses		-0.513***(-53.20)
TOP1		-0.001***(-7.11)
Cflow		-0.200***(-7.95)
TobinQ		0.002***(9.06)
Year/Industry	Controls	Controls
Constant	7.303***(139.00)	-5.247***(-109.65)
Observations	40,694	40,684
R-squared	0.134	0.820
adj_R2	0.133	0.820
F	196.5	4410

Note: ***, **, and * indicate significance at the 1%, 5%, and 10% levels respectively;

4. Analysis of Empirical Results

4.1 Basic Regression Analysis

In column (1) of Table 1, without considering control variables, the regression coefficient for enterprise digital transformation (Dig) is 0.175, which is statistically significant at the 1% level. In column (2), after incorporating all control variables, the regression coefficient changes to 0.033, which also remains significant at the 1% level, thus supporting Hypothesis 1.

4.2 Testing the Mechanism

To test Hypotheses 2 and 3, a mediating effect analysis was conducted, extending from Model (1) through to Model (5). Columns (1) to (3) in Table 2 present the test results with management efficiency as the mediating mechanism. The result in column (2) shows that the impact coefficient of digital transformation (Dig) on management efficiency (ME) is 0.573, which is significant at the 1% level. The result in column (3) shows that the regression coefficient of the mediator (ME) is significant at the 1% level, and the regression coefficient for digital transformation is also significantly positive, indicating that management efficiency partially mediates the effect of digital transformation on enterprise development. Hypothesis 2 is confirmed.

Table 2. Mediating Effects of Management Efficiency and Financing Ability

	(1)	(2)	(3)	(4)	(5)
	TFP	ME	TFP	indexSA	TFP
Dig	0.033***	0.573***	0.033***	0.006***	0.033***
	(13.27)	(4.47)	(13.16)	(5.63)	(13.17)
ME			0.000***		
			(4.98)		
indexSA					0.041***
					(3.63)
Constant	-5.247***	-34.974***	-5.231***	4.424***	-5.429***
	(-109.66)	(-14.15)	(-109.08)	(210.80)	(-78.43)
Observations	40,684	40,684	40,684	40,684	40,684
R-squared	0.820	0.439	0.820	0.433	0.820
adj_R2	0.820	0.439	0.820	0.433	0.820
F	4517	776.7	4413	757.6	4411

The result in column (4) shows that the regression coefficient for digital transformation is 0.006, significant at the 1% level. Column (5) shows that after adding the mediating variable of financing capacity (indexSA), the regression coefficient for digital transformation's impact on total factor productivity (TFP) is 0.033, significantly positive at the 1% level. The regression coefficient for financing capacity on TFP is 0.041, also significant at the 1% level, indicating that the stronger the enterprise's financing capacity, the better its development. Hypothesis 3 is confirmed.

4.3 Treatment of Endogeneity Problems

As the impact of digital transformation on enterprise development exhibits a time lag, the explanatory variable for digital transformation is lagged by one period and two periods, and the model (1) is re-estimated. The results are presented in columns (1) and (2) of Table 3,

where the coefficients of the explanatory variables are significant at the 1% level. This paper uses the annual total postal and telecommunication value of the province as an instrumental variable (Post). The results in columns (3) and (4) of Table 3 present the outcomes of the instrumental variable regression analysis using the two-stage least squares method. The regression coefficients are significant at the 1% level. The results indicate that after applying the instrumental variable test, the finding that digital transformation promotes enterprise development remains valid.

Table 3. Results of Endogeneity Tests

	(1)	(2)	(3)	(4)
	TFP	TFP	Dig	TFP
Dig_{t-1}	0.034***			
	(12.92)			
Dif_{t-2}		0.031***		
		(11.20)		
Post			0.000***	
			(11.44)	
Dig				0.283***
				(5.79)
Constant	-5.331***	-5.267***	-2.392***	-4.675***
	(-106.17)	(-98.30)	(-25.12)	(-37.42)
Observations	36,452	32,543	40,675	40,675
R-squared	0.827	0.824	0.417	0.775
adj_R2	0.827	0.824	0.416	0.774
Kleibergen-Paap rk LM statistics				44.07
Kleibergen-Paap Wald rk F statistics				47.26
Hansrn J P-val				0.000

5. Conclusions

This paper takes A-share listed companies as the research sample. Based on theoretical analysis, it first conducts an empirical study on the impact of digital transformation on high-quality enterprise development. The results show that digital transformation helps enhance enterprise development. In the process of digital transformation promoting high-quality development, management efficiency and financing capacity play mediating roles. Specifically, enterprises can reduce information asymmetry, improve financing accessibility, lower financing costs, foster innovation in management models, and enhance management efficiency, thereby increasing total factor productivity.

Enterprises should recognize the positive impact of digital transformation on accelerating development. They need to formulate and implement comprehensive digital transformation strategies based on their own circumstances, applying digital technologies to production, management, sales, and other areas, optimizing business processes and innovating business models. At the same time, enterprises should leverage digital tools, such as digital performance management systems and supply chain management systems, to break down information barriers between departments, promote internal information flow, and facilitate cross-departmental collaboration. This will improve the accuracy and timeliness of decision-making and enhance overall management efficiency.

At the governmental level, there are several key actions to be taken. First, the government must prioritize the enhancement of digital infrastructure by increasing investments in critical areas such as 5G networks and data centers, thus establishing a strong foundation for the digital transformation of businesses. In addition, the government should actively encourage enterprises to innovate in core technologies, promoting collaborations between companies and research institutions to boost R&D in areas like advanced computing, artificial intelligence, and smart chips. This would help overcome existing technological barriers, offering both technical and financial support for the digital transformation efforts of enterprises. Moreover, the government needs to develop tailored policies that cater to the unique characteristics of businesses based on

their ownership structures and industries. For example, it could provide guidance on structural reforms for state-owned enterprises to facilitate their digital transition and offer pilot programs and financial aid to support the digital transformation of non-manufacturing sectors. This approach aims to ensure the coordinated progress of digital transformation across various industries. Finally, fostering a favorable policy environment is essential. This includes refining existing laws, regulations, and policies, strengthening measures related to data security and privacy, ensuring the proper regulation of the digital economy, and reducing the policy and environmental risks businesses face during their digital transformation journey

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