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Research on the impact of digital transformation on the high-quality development of enterprises

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Abstract. In recent years, under the background of mass entrepreneurship and innovation, China has vigorously promoted the digital transformation of enterprises. Taking A-share listed companies in Shanghai and Shenzhen Stock exchanges from 2012 to 2022 as samples, this paper empirically tests the relationship between corporate digital transformation and high-quality development of enterprises. At the same time, the internal control of enterprises and the degree of financing constraints play a regulatory role between digital transformation and high-quality development of enterprises; In the samples with different ownership nature and whether they are high-tech enterprises, the effect of enterprise digital transformation on the high-quality development of enterprises is different.

Keywords: digital transformation; High-quality development of enterprises; Total factor productivity; Internal control; Constraints on financing.

1. Introduction

In recent years, with the rapid development and popularization of information technology, digital transformation has become one of the key paths for enterprises to move towards high-quality development. Traditional industries are gradually realizing the importance of digital transformation and regard it as a key strategy to enhance competitiveness, improve production efficiency and improve service quality. However, digital transformation is not only about technology upgrading and tool application, but also a comprehensive change process involving organizational structure, management mode and culture transformation. In the wave of digital transformation, enterprises are faced with many challenges such as how to balance technology input and output, how to cross management and cultural barriers, and how to ensure information security and data privacy. Therefore, in-depth research on the relationship between digital transformation and high-quality development of enterprises, and exploration of its influencing mechanism and key factors are of great significance for guiding enterprises to achieve sustainable development. However, at present, there has not been a systematic theoretical framework and in-depth empirical research on the influence mechanism and action path of digital transformation on the high-quality development of enterprises, which needs further discussion and research.

This study selects A-share listed companies in Shanghai and Shenzhen from 2012 to 2022 as samples to verify the impact of digital transformation on the high-quality development of enterprises. From the perspective of internal control and financing constraints, this paper discusses the moderating variables of digital transformation affecting the high-quality development of enterprises, provides theoretical guidance and practical support for the digital transformation of enterprises, and promotes the high-quality development of enterprises.

2. Literature review and hypothesis formulation

2.1. Literature review

2.1.1. Research on the economic consequences of enterprise digital transformation

Most scholars have studied the economic consequences of enterprise digital transformation from the aspects of productivity improvement, cost reduction, innovation ability improvement, market competitiveness improvement and employment impact. Lou et al. (2023) conducted an empirical test on the relationship between digital transformation and supply chain commercial credit financing, and found that the higher the degree of digital transformation of an enterprise is, the more commercial financing it can obtain from suppliers[1]. Qian et al. (2021) analyzed the basic types of business models in the process of enterprise digital transformation and identified the innovation sources of digital business models through multiple case studies[2]. From the perspective of enterprise performance, Yi et al. (2021) studied the relationship between the degree of digital transformation and main business performance, and found that enterprise digital transformation drives the main business performance to significantly improve from multiple dimensions[3]. Wang et al. (2022) studied the impact of digital transformation on enterprise risk-taking and found that digital transformation can significantly improve the level of enterprise risk-taking[4]. Nie et al. (2022) studied the relationship between enterprise digital transformation and accounting information comparability[5]. Zhu et al. (2024) studied the impact of the degree of digital transformation on the human capital structure of enterprises, and found that digital transformation can narrow the internal salary gap[6].

2.1.2. Research on the influencing factors of high-quality development

Existing scholars have studied the influencing factors of high-quality development from the aspects of institutional environment, innovation ability, human resources, capital market and social responsibility. Zhao et al. (2024) studied the impact of new quality productivity on high-quality development and found that new quality productivity has a significant driving effect on new industrialization and high-quality development[7].Xu et al. (2024) studied the relationship between the allocation of enterprise asset structure and the high-quality development of enterprises, and found that the misallocation of asset structure affects the efficiency of enterprise resource allocation, thus inhibiting the high-quality development level of enterprises[8]. Zhang et al. (2023) studied the relationship between economic policy uncertainty and the high-quality development of enterprises, and found that commercial credit supply and financing play an intermediary role between the two, and economic policy uncertainty will have an inhibitory effect on the high-quality development of enterprises[9]. Jiang et al. (2023) studied the relationship between audit quality and high-quality development of enterprises, and found that audit quality promotes high-quality development of enterprises by improving corporate reputation[10]. Du Han (2023) studied the impact of the team pay gap on the high-quality development of enterprises and the role of the overseas background of executives, and found that the pay gap of the top management team significantly promoted the high-quality development of enterprises, and the overseas background of executives played a positive moderating role[11].

2.1.3. Research on the relationship between enterprise digital transformation and high-quality development

Guo (2023) studied the impact of digital transformation on enterprises' TFP and found that digital transformation improved enterprises' total factor productivity through multiple levels[12]. Shi (2023) found that digital economy can improve the production efficiency and quality of enterprises, enhance the competitiveness of enterprises[13].Li Siyi (2023) found that digital transformation can promote high-quality development of enterprises by providing high-quality accounting information[14].

2.2. Hypothesis formulation

This research chapter mainly uses empirical models to analyze the impact of digital transformation on the high-quality development of enterprises. The selected variables are explained and the research hypothesis is proposed. The two-way fixed effect is adopted for analysis, and the proposed research hypothesis is verified according to the empirical analysis results. The impact of digital transformation on the high-quality development of enterprises is analyzed, and the internal control and financing constraints are introduced as moderating variables to analyze their moderating effect on the digital transformation and the high-quality development of enterprises. The results of the study are finally discussed.

2.2.1. Digital transformation and high-quality development of enterprises

On the one hand, digital transformation improves the value of relevant information through data collection and mining, reduces information asymmetry in the process of digital services, and reduces moral hazard and adverse selection in the process of investment and financing. The matching of risk and return based on massive data information mining and artificial intelligence analysis makes the risk management in the process of capital allocation more efficient. This capital allocation effect provides more efficient support for enterprise development, thus promoting high-quality economic development. On the other hand, digital transformation can improve the economic benefits of enterprises, so that enterprises have more strength and resources to think about and invest in high-quality development and production. By improving customer satisfaction and loyalty, enterprises can build a good reputation and better adapt to the market environment, so as to better promote the high-quality development of enterprises.

Based on this, hypothesis 1 is put forward:

H1: Digital transformation contributes to high-quality development of enterprises.

2.2.2. The moderating effect of internal control between digital transformation and high-quality development of enterprises

According to the risk management theory, internal control plays a pivotal role in enterprise risk management, especially in the process of digital transformation. Having a high-scoring internal control means that an enterprise can accurately and efficiently identify, evaluate and control all kinds of risks in the process of digital transformation, whether technical, operational or market risks, can be properly handled. By reducing these risks, enterprises can more steadily promote digital transformation, provide a safer environment for high-quality development of enterprises, and then promote the successful implementation of high-quality development of enterprises.

Based on the above, this study puts forward hypothesis H2:

H2: With other conditions unchanged, the higher the score of internal control is, the more significant the positive effect of digital transformation on the high-quality development of enterprises is.

2.2.3. The moderating effect of financial constraints between digital transformation and high-quality development of enterprises

According to the resource limitation theory, enterprises need a large amount of capital investment for technology research and development, talent introduction, equipment update and other aspects when carrying out digital transformation. However, the existence of financing constraints increases the difficulty for enterprises to obtain external funds, which may lead to insufficient investment in digital transformation. The lack of funds not only limits the ability of enterprises to adopt cutting-edge technologies, expand broader markets or develop innovative products, but also fundamentally restricts the positive role of digital transformation in promoting high-quality development of enterprises. In short, financing constraints seriously affect the innovation vitality and market competitiveness of enterprises in the process of digital transformation by causing capital shortage.

Based on the above, Hypothesis H3 is proposed:

H3: With other conditions unchanged, the degree of financing constraints can weaken the positive impact of digital transformation on the high-quality development of enterprises.

3. Research design

3.1. Sample selection and data sources

This study selects A-share listed companies in Shanghai and Shenzhen from 2012 to 2022 as samples, refers to the method of Wu et al. (2021), and counts the word frequencies of five dimensions, including artificial intelligence technology, blockchain technology, cloud computing technology, big data technology and digital technology application, as the measurement value of enterprise digital transformation level. Excluding the financial industry, ST, PT and the sample data with missing data, the enterprise characteristic data, financial data and other relevant data are from the CSMAR database. At the same time, in order to reduce the impact of extreme values, the variables are winsorized at 1%-99% quantiles.

3.2. Definition of variables

3.2.1. Explained variable: high-quality development of enterprises (INP)

Referring to Lu Xiaodong (2007), this study chooses LP and OP methods to calculate the total factor productivity index of enterprises, and then measures the high-quality development of enterprises.

(1) The LP method is used to calculate corporate TFP

In general, the state variable is usually capital, while the free variable is usually labor. The OP method needs to satisfy the monotonically increasing relationship between investment and productivity.

$$e_{it} = y_{it} - w_{it}\hat{\beta} - \partial_0 - x_{it}\gamma^* - g\ (\hat{\Phi}_{it-1} - x_{it-1}\gamma^*) \quad (1)$$

Using this formula, all coefficients in the production function can be successfully estimated, and the pair value of the residual in the production function can be fitted, which is the pair value of the total factor productivity.

LP method is an improvement of OP method, and its core idea is: instead of using investment amount as proxy variable, it is replaced by intermediate product input index. LP method allows researchers to flexibly select proxy variables according to available data.

(2) Using the OP method to calculate the total factor productivity of enterprises

The OP method needs to meet the monotonic increase between investment and productivity, excluding samples with zero investment, which cannot be estimated.

3.2.2. Explanatory variable: Digital Transformation of the Enterprise (DIG)

This study refers to Wu Fei et al. (2021) and uses the word frequency statistics of digital transformation in the annual report to construct enterprise digital transformation indicators, such as "artificial intelligence technology," "big data technology," "blockchain technology" and "cloud computing technology." Where DIG1 is the sum of the word frequencies of the above dimensions in the annual report plus one, and then the natural logarithm is taken. DIG2 is the sum of the word frequencies of the above dimensions obtained from the management discussion plus one, and the natural logarithm is also taken.

Table 1. Table of variable definitions

Variable category	Variable name	Variable meaning	calculation method
Explained variable	INP	High quality development of enterprises	Indicators of total factor productivity of enterprises calculated by the LP and OP methods
Explanatory variable	DIG1	Digital Transformation Index 1	The sum of word frequencies in the five dimensions of artificial intelligence technology, blockchain technology, cloud computing technology, big data technology and digital technology application plus one, and the natural logarithm (annual report)
	DIG2	Index 2	(management discussion)
Moderating variable	Incontrol	Internal Control Index	Internal control index of DIBO internal control quality database
	Constraints	Financing constraints	SA index
Control variable	Leverage	Asset-liability ratio	Total liabilities/total assets
	Size	Firm size	Natural logarithm of total assets at year-end
	ROA	Margin on total assets	Net profit/average balance of total assets
	Growth	Operating income growth rate	Amount of operating income for the current period
	Indep	Percentage of independent directors	Ratio of the number of independent directors to the size of directors
	Top1	Ownership concentration	Shareholding ratio of the largest shareholds(%)
	CashFlow	Cash flow ratio	Net CashFlow from operating activities/total current liabilities
	Board	Board size	Number of directors on the board
	Top10	Ownership concentration	Shareholding ratio of top ten substantial shareholders(%)

3.3. Model setting

This study intends to construct the following multiple regression model to test the impact of digital transformation on the high-quality development of enterprises.

$$INP_{i,t} = \alpha_0 + \alpha_1 DIG_{i,t-1} + \alpha_i Controls_{i,t-1} + \theta + \gamma + \varepsilon_{i,t} \quad (2)$$

Where the subscript i represents the enterprise and t represents the year; Controls stands for all control variables, It includes company Size (Size), asset-liability ratio (Lev), total asset-liability ratio (ROA), cash ratio (Cashflow), Growth rate of operating income (Growth), Board size (Board), proportion of independent directors (Indep), shareholding ratio of top ten major shareholders (Top10); θ represents year fixed effect, γ represents industry fixed effect; ε represents the residual term. At the same time, the independent variables and control variables are lagged by one period to eliminate the possible reverse causality problem and ensure the robustness of the results. The impact of high-quality development of the industry.

4. Empirical analysis

4.1. Descriptive statistics

Table 2 reports the basic statistical characteristics of the main variables. It can be seen from the descriptive analysis table that the mean values of digital transformation are 1.065 and 0.762, the standard deviations are 1.344 and 1.136, the minimum value is 0, and the maximum value is 6.031. The median and mean of INP are 6.542 and 6.637, respectively, while the standard deviation is 0.936,

reflecting the concentration of data distribution. In general, the descriptive statistical results of the control variables involved in the model are generally consistent with those of previous studies, and are within a reasonable range.

Table 2. Descriptive statistics

Variable	N	Mean	SD	p50	Min	Max
TFP OP	40091	6.637	0.936	6.542	1.079	11.45
Digital CS~1	40091	1.065	1.344	0.693	0	6.301
Digital CS~2	40091	0.762	1.136	0	0	5.938
Size	40089	22.14	1.359	21.96	13.76	28.64
Lev	40089	0.464	0.940	0.436	-0.195	124.0
ROA	40090	0.0370	0.148	0.0370	-6	12.21
Cashflow	40086	0.0480	0.330	0.0450	-10.22	62.79
Growth	40061	3.829	672.7	0.105	-1	134607
Board	40089	2.129	0.204	2.197	0	2.890
Indep	40089	0.375	0.0560	0.357	0	1
Top10	40091	0.571	0.155	0.577	0.0130	1.012

4.2. Benchmark regression: the impact of digital transformation on the high-quality development of enterprises

Table 3. shows the benchmark regression results of Model (1). The empirical results show that columns 1 and 3 show the regression results without adding control variables, and the results show that the coefficients of digital transformation are 0.069 and 0.060 respectively. After the control variables are added, the regression coefficients of digital transformation and high-quality development of enterprises are 0.031 and 0.304 respectively, which are still positive and significant at the level of 1%, which fully indicates that digital transformation can promote high-quality development of enterprises.

Table 3. Regression results of digital transformation on high-quality development of enterprises

	(1) TFP_OP	(2) TFP_OP	(3) TFP_OP	(4) TFP_OP
$Digital1_{t-1}$	0.069***	0.031***		
	(8.54)	(5.55)		
$Digital2_{t-1}$			0.060***	0.304***
			(6.65)	(17.13)
$Size_{t-1}$		0.301***		0.208***
		(16.81)		(3.58)
Lev_{t-1}		0.209***		0.859***
		(3.58)		(8.84)
ROA_{t-1}		0.862***		0.258***
		(8.90)		(3.23)
$Cashflow_{t-1}$		0.258***		0.185***
		(3.22)		(17.81)
$Growth_{t-1}$		0.185***		0.012
		(17.78)		(0.29)
$Board_{t-1}$		0.009		0.046
		(0.22)		(0.45)
$Indep_{t-1}$		0.045		0.025
		(0.45)		(0.29)
$Top10_{t-1}$		0.027		0.026***
		(0.32)		(4.23)
_cons	6.599***	-0.246	6.630***	-0.296
	(784.24)	(-0.65)	(1057.27)	(-0.79)
Year·FE	Yes	Yes	Yes	Yes
Industry·FE	Yes	Yes	Yes	Yes
N	34983	34956	34983	34956
AR^2	0.791	0.836	0.790	0.836

4.3. Moderating effect

4.3.1. Internal control

In order to verify the moderating effect of internal control on the relationship between digital transformation and the high-quality development of enterprises, this paper conducts a regression test on the interaction term of digital transformation and internal control. The test results are shown in Table 4 below, and the coefficients of the interaction terms between digital transformation and internal control are all positive and significant at the significance levels of 10% and 5% respectively.

Table 4. Adjusting effects of internal control

	(1) TFP_OP	(2) TFP_OP
$Digital1_{t-1}$	-0.006	
	(-0.72)	
$Digital2_{t-1}$		-0.013
		(-1.52)
$Digital1 \times Incontrol_{t-1}$	0.000*	
	(1.93)	
$Digital2 \times Incontrol_{t-1}$		0.001**
		(2.27)
$Controls_{t-1}$	Yes	Yes
Year·FE	Yes	Yes
Industry·FE	Yes	Yes
N	34891	34891
AR^2	0.882	0.882

4.3.2. Financial constraints

In order to verify the moderating effect of financial constraints on digital transformation and high-quality development of enterprises, this paper conducts regression tests on the multiplicative item of digital transformation and financial constraints. The test results are shown in the following table, and it can be seen from Table 5 that the coefficients of the interaction term between digital transformation and financial constraints are all negative.

Table 5. Adjusting effects of financing constraints

	(1) TFP_OP	(2) TFP_OP
$Digital1_{t-1}$	0.029***	
	(4.66)	
$Digital2_{t-1}$		0.018***
		(3.37)
$Digital1 \times Constraint_{t-1}$	-0.005***	
	(-5.13)	
$Digital2 \times Constraint_{t-1}$		-0.006***
		(-5.75)
$Controls_{t-1}$	Yes	Yes
Year·FE	Yes	Yes
Industry·FE	Yes	Yes
N	34954	34954
AR^2	0.834	0.833

4.4. Heterogeneity analysis

The companies are tested by grouping according to whether they are state-owned enterprises or not. As shown in Table 6, the study finds that in state-owned enterprises, digital transformation and high-quality development of enterprises are significantly positive at the level of 1%, indicating that digital transformation can promote high-quality development of enterprises. This indicates that soes have more resources and policy support and can make more effective use of digital transformation to

promote high-quality development of enterprises, while non-soes may need to apply digital technology more flexibly and innovatively to find competitive advantages and innovation paths different from soes.

Table 6. Heterogeneity of equity nature

	(1) TFP_OP	(2) TFP_OP
$Digital_{t-1}$	0.027***	0.008
	(3.79)	(1.65)
$Controls_{t-1}$	Yes	Yes
Year·FE	Yes	Yes
Industry·FE	Yes	Yes
N	13848	20775
AR^2	0.859	0.863

4.5. Robustness test: changing the explained variable

In order to verify the robustness of the conclusion, the measurement index of the explained variable of enterprise high-quality development in this paper is changed from TFP_OP to TFP_LP.

Table 7. Replace the regression results of explained variables

	(1) TFP_LP	(2) TFP_LP	(3) TFP_LP	(4) TFP_LP
$Digital1_{t-1}$	0.041***		0.030***	
	(6.58)		(5.38)	
$Digital2_{t-1}$		0.038***		0.027***
		(5.39)		(4.42)
$Controls_{t-1}$	Yes	Yes	Yes	Yes
Year·FE	Yes	Yes	Yes	Yes
Industry·FE	Yes	Yes	Yes	Yes
N	34956	34956	34956	34956
AR^2	0.876	0.876	0.915	0.914

5. Research conclusions and suggestions

5.1. Research conclusion

As an important part of enterprise strategy, enterprise digital transformation can help enterprises take advantage in the increasingly fierce competition, promote the high-quality development of enterprises and move forward. Taking A-share listed companies from 2012 to 2022 as research samples, this paper explores the relationship between digital transformation and high-quality development of enterprises. It is found that the digital transformation of enterprises can significantly positively affect the high-quality development of enterprises; At the same time, this paper also introduces the internal control of enterprises and the degree of financing constraints, and the results show that with other conditions unchanged, the digital transformation of enterprises can significantly positively affect the high-quality development of enterprises; the internal control of enterprises and the degree of financing constraints play a regulatory role between digital transformation and high-quality development of enterprises.

5.2. Research suggestions and prospects

The research conclusions of this paper help enterprises to further promote digital transformation and high-quality development of enterprises. Enterprises should actively promote digital transformation, remove obstacles hindering digital transformation, make full use of the bonus period of digital transformation, improve the efficiency of production and operation of enterprises, save the cost of production and operation of enterprises. Second, enterprises should pay attention to internal flexibility,

set up a reasonable organizational structure, give employees appropriate rights, let employees participate in the process of high-quality development of enterprises, and help enterprises achieve their goals faster. Third, enterprises should increase resource investment, reduce the lag effect, and actively promote the role of digital transformation in promoting the high-quality development of enterprises.

References

[1] Liu Y X. Research on the impact of enterprise digital transformation on Internal control quality [D]. Beijing University of Chemical Technology,2023.

[2] Qian, Y. & Sun, X. Digital Business Model Design: A Case study on Enterprise Digital Transformation and Business Model Innovation [J]. Management Review,2021,33(11):67-83.

[3] Yi Luxia, Wu Fei, Xu Siyang. Research on performance driving effect of enterprise Digital Transformation [J]. Securities Market Herald,2021,(08):15-25+69.

[4] Wang, H., Chen, X. & Chen, W. et al. Can digital transformation improve a firm's level of risk-taking? Journal of Finance and Economics,2022,(12):70-80.

[5] Nie, X., Wang, W. & Pei, X. Will enterprise Digital Transformation affect the Comparability of Accounting information? [J]. Accounting Research,2022,(05):17-39.

[6] Zhu, X. & Ma, Y. How digital transformation promotes the upgrading of enterprise human capital structure [J/OL]. Economic Management,1-21[2024-05-06].

[7] Zhao, R., Song, X. & Chen, H. New Quality productivity, New Industrialization and High quality Development [J/OL]. Finance and Economics,1-15[2024-05-06].

[8] Xu, Z. & Zhang, N. Research on the impact of asset structure allocation on the high-quality development of enterprises: based on the analysis of the adjustment effect of digital economy [J/OL]. Research Management,1-10[2024-05-06].

[9] Zhang, X. & Liu, Y. Economic policy uncertainty, business credit and high quality development of enterprises [J]. Monthly Journal of Finance and Accounting,2023,44(24):39-46.

[10] Jiang, Y. & Wu, Y. et al. Audit quality, corporate reputation and corporate high-quality development [J]. Scientific Decision,2023,(08):98-112.

[11] Du H. The Impact of top management Team pay Gap on Enterprise high-quality Development [D]. Shaoxing College of Arts and Sciences,2023.

[12] Guo, X. The influence of digital transformation of total factor productivity of the enterprise research [D]. Shandong university, 2023. The DOI: 10.27272 /, dc nki. Gshdu. 2023.007685.

[13] Shi, Manzhen. Research on the Impact of Digital Economy on high-quality Economic Development [D]. Jiangxi University of Finance and Economics,2023.

[14] Li, S. Digital transformation, accounting information quality and enterprise high-quality development [J]. Science and Technology and Industry,2023,23(14):66-72.