Research on the Impact of Digital Transformation on the Value of Equipment Manufacturing Enterprises

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Abstract. This empirical study focuses on equipment manufacturing enterprises, utilizing data from listed Chinese equipment manufacturing companies spanning from 2003 to 2022 to investigate the correlation between digital transformation and enterprise value. The findings reveal that digital transformation notably elevates the value of equipment manufacturing enterprises. Moreover, the quality of information disclosure and the degree of government intervention serve as moderating factors in this relationship. These discoveries offer empirical support for relevant authorities to refine policies pertaining to the digital economy, ultimately expediting the development of the digital economy framework and fostering seamless integration between equipment manufacturing enterprises and the digital realm.

Keywords: digital transformation; value of equipment manufacturing enterprises; green innovation; production efficiency; information disclosure; government intervention

1 Introduction

Since the 21st century, digital technologies such as the Internet and big data have had a profound impact on human society, ushering in the era of the digital economy. President Xi Jinping has emphasized the need to accelerate the development of the digital economy and promote its integration with the real economy.

The digital economy has become a key driver of China's economic growth. In 2022, China's digital economy reached a considerable scale, ranking second in the world. As the core of the national economy, the high-quality development of the equipment manufacturing industry is crucial to national competitiveness. For equipment manufacturing enterprises, seizing the opportunities of the digital economy for digital transformation is the key to achieving industrial upgrading and enhancing enterprise value. Therefore, studying how digital transformation affects the value of equipment manufacturing enterprises has profound practical significance.

2 Literature Review

Fitzgerald et al. (2014) [1] proposed that digital transformation is a process driven by digital technology that deeply reshapes the way enterprises operate, thereby pushing the entire industry towards a higher degree of digital evolution. MATT et al. (2015) [2] believed that the core concept of digital transformation lies in the deep application of digital technology to achieve a

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high degree of automation in business processes. This process may not only facilitate the upgrading of products and services but also lead to significant adjustments and reforms in the internal organizational structure of enterprises. Vial (2021) [3] proposed that digital transformation is essentially the deep integration of information, communication, and technology. Technological progress not only provides opportunities for enterprise transformation but also brings pressure and challenges to their innovation activities (Ruggieri, 2018) [4]. Verhoef et al. (2021) [5] emphasized that industrial digitization has profoundly affected the competitive landscape and market demand in the industry, constituting an external consideration that cannot be ignored in the digital transformation of enterprises. Digitization not only optimizes business processes but also improves the market competitiveness of enterprises, thus having a significant positive effect on the overall financial situation of enterprises (Eller et al., 2020) [6]. Chen et al. (2021) [7] stated that after the application of digital technology, more analysts are paying attention to the company, and the degree of prediction has increased, demonstrating the role of digital technology in reducing information asymmetry. At the same time, many scholars have studied how digital transformation affects enterprise value and performance. Digital transformation can not only promote business model innovation but also effectively enhance the technological innovation capability of enterprises, bringing broader development space and competitive advantages to enterprises (Ciampi et al., 2021) [8]. Bharadwa et al. (2000) [9] found that IT information investment is significantly positively correlated with the Tobin's Q value of enterprises. Some scholars have also found that from the perspective of supply chain digitization, digitization can improve production efficiency, thereby enhancing the market value of enterprises and injecting new vitality into enterprise development (Chen, 2016) [10].

Despite numerous case studies on digital transformation and the value of manufacturing enterprises, research specifically focused on equipment manufacturing enterprises remains scarce. Through empirical analysis, this paper explores the intrinsic connection between the two, aiming to provide scientific guidance and reference to help enterprises maximize their value and fill the gaps in existing research.

3 Theoretical Analysis and Research Hypothesis

3.1 Digital Transformation and the Value of Equipment Manufacturing Enterprises

Digital transformation notably boosts labor productivity, resource allocation, decision-making, and total factor productivity, elevating corporate performance and market value. It also enhances information flow, mitigates information asymmetry, unlocks data value with big data tech, enables precise production/sales, and cuts costs. Furthermore, it clarifies labor divisions, trims labor expenses, boosts efficiency, and fosters resource allocation. Digital transformation also paves new avenues for equipment manufacturing innovation, targeting market needs and consumer tastes, boosting innovation efficiency and product competitiveness, and easing market entry. It fosters sales platform networking, aids R&D-customer interactions, ups new product success rates, and drives equipment manufacturing innovation.

Based on this, we propose the hypothesis:

H1: Digital transformation in equipment manufacturing enterprises significantly promotes enterprise value.

3.2 Analysis of Moderating Effects

Quality of Information Disclosure.

Listed cos. must integrate fin. & non-fin. info., form reports for market disclosure, & provide an analytical basis for stakeholders & researchers. High-quality info. disclosure is crucial in supervising digital transformation. Past false disclosures harmed corp. images & capital market integrity. High-quality disclosure mitigates moral hazards, opportunistic behaviors, & stock manipulation, improves exec. comp. sensitivity to performance, & boosts enterprise value. It also balances stakeholder needs in digital transformation. Capital markets face info. asymmetry, disadvantaging vulnerable parties. Digital techs. like big data & AI aid equipment manufacturers in adapting to markets & efficient info. exchange. High-quality disclosure reduces info. asymmetry, aids stakeholders in obtaining digital transformation info., optimizes resource allocation, & enhances enterprise value.

Based on this, we propose the hypothesis:

H2: The quality of information disclosure can positively moderate the relationship between digital transformation and the value of equipment manufacturing enterprises.

Degree of Government Intervention.

Enterprise growth relies on a stable environment, highlighting the government's key role. The gov't must craft regional policies, refine institutions, and optimize tech resources and achievements. It should direct human capital and innovation flow, enhance tech innovation, drive digital shifts, and regional progress. Local admins must refine fiscal and tax measures for the digital economy, supporting digital shifts in manufacturing. In economic synchronization, government involvement is crucial for resource allocation in various areas. The local industrial structure impacts the value of digital shifts in manufacturing, and relying solely on markets can widen disparities. Thus, efficient resource use is vital for boosting local capacity, efficiency, and overall economic growth. The government, as a service entity, significantly impacts digital transformation through its policies.

Based on this, we propose the hypothesis:

H3: The degree of government intervention can positively moderate the relationship between digital transformation and the value of equipment manufacturing enterprises.

4 Method

4.1 Sample Selection and Data Source

This study selected equipment manufacturing enterprises listed on China's A-share market from 2003 to 2022, excluding ST and ST* enterprises, those lacking key variables, and computer, communication, and other electronic equipment manufacturing companies closely related to big data, obtaining 6,269 valid samples. The core data originates from corporate annual reports, while additional data comes from databases such as the China Statistical Yearbook and Guotaian.

4.2 Variable Setting

See Table 1 for the selection and explanation of specific variables. In addition ,The control variables selected in this paper are: time to market (lnage); human capital (Lnp); return on assets (roa); enterprise scale (lnsize); sales revenue growth rate (growth) and other variables for control.

Table 1. Main Variable Definition Table

Variable Types	Variable Name	Variable Symbol	Variable Definition
Explained Variables	Enterprise Value	Tobin′ s Q	The ratio of a company's current market value to its total assets.
Core Explanatory Variables	Digital Transformation Degree of Equipment Manufacturing Enterprises	DIGI	Synthesized based on the frequency of digital transformation keywords (DIGI-text) in corporate annual reports and the progress of digital transformation (DIGI-score) analyzed from keywords in these reports, with each component standardized and weighted at 50%.
Moderating variable	Quality of Information Disclosure	KV	KV Index
	Degree of Government Intervention	Gov	Local fiscal expenditure/regional GDP

4.3 Model construction

Baseline regression model.

Since the number of sampled enterprises has reached 853, the introduction of too many dummy variables by using the individual fixed effect model will reduce the flexibility of the model. Therefore, this paper chooses a fixed time and industry empirical model for analysis, in order to more accurately study the digital transformation mechanism of enterprises and provide theoretical support for practice.

$$\text{Tobin's } Q_{it} = \alpha_0+\alpha_1 DIGI_{it}+Controls_{it}+Year_t+Ind_i+\varepsilon_{it} \quad (1)$$

In Model (1), i and t represent region and time, respectively. Tobin's Q represents the value of equipment manufacturing enterprises, DIGI represents digital transformation, and Controls represents a series of control variables; Yeart represents the fixed time effect, Indi represents the fixed industry effect, and ε represents the random error term.

Moderation effect model.

This study intends to construct the following equations to verify the moderating effect:

$$\text{Tobin's } Q_{it} = \eta_0+\eta_1 DIGI_{it}+\eta_2 DIGI_{it}*External_{it}+\eta_3 Controls_{it}+Year_t+Ind_i+\varepsilon \quad (2)$$

Among them, Externalit is a group of moderating variables, representing information disclosure quality and the degree of government intervention, respectively, while the meanings of the other symbols remain unchanged.

5 Result

5.1 Baseline regression results

To investigate the effect of digital transformation on enhancing the value of equipment manufacturing enterprises, Model (1) was adopted for testing, and the regression analysis results are presented in Table 2. Column (1) displays the regression results without the inclusion of control variables, indicating a regression coefficient of 0.891 for digital transformation (DIGI), which is significant at the 1% statistical level. In Column (2), control variables are further introduced, and the regression coefficient for digital transformation decreases to 0.478 but remains significant at the 1% statistical level. This variation may be attributed to the absorption of factors influencing enterprise value by certain control variables. Consequently, this outcome further corroborates that enhancing the level of digital transformation in equipment manufacturing enterprises can effectively increase enterprise value, thereby validating Hypothesis H1.

Table 2. empirical results

VARIABLES	(1) Tobin's Q	(2) Tobin's Q	(3) Tobin's Q	(4) Tobin's Q
DIGI	0.891***	0.478***	0.490***	0.484***
	(5.70)	(3.33)	(3.43)	(3.40)
KV			-0.010	
			(-0.07)	
DIGI*KV			-3.745***	
			(-3.09)	
Gov				0.393*
				(1.81)
DIGI*Gov				6.568**
				(2.16)
lnage		0.028	-0.014	-0.007
		(0.30)	(-0.14)	(-0.08)
lnp		0.078*	0.068	0.069
		(1.76)	(1.54)	(1.56)
roa		3.007***	3.309***	3.354***
		(9.25)	(10.35)	(10.54)
lnsize		-0.423***	-0.421***	-0.422***
		(-21.56)	(-20.43)	(-21.10)
growth		0.157***	0.004*	0.004*
		(4.22)	(1.76)	(1.81)
Indrat		0.004*	-0.008***	-0.008***
		(1.71)	(-8.58)	(-8.53)
oneshare		-0.007***	0.012***	0.012***

		(-8.33)	(18.26)	(18.14)
isr		0.012***	-0.152*	-0.150*
		(18.26)	(-1.82)	(-1.81)
lev		-0.213**	10.617***	10.551***
		(-2.53)	(28.51)	(30.07)
Constant	1.905***	10.573***	6,269	6,269
	(130.70)	(30.26)	0.337	0.337
Observations	6,269	6,269	YES	YES
R-squared	0.157	0.338	YES	YES
Industry FE	YES	YES		
Year FE	YES	YES		

5.2 Results of moderating effect test

Information disclosure quality.

In Table 2, Column 3, the dependent variable is the value of equipment manufacturing enterprises (measured by Tobin's Q), and the independent variable is the degree of digital transformation (DIGI). It can be seen that the coefficient of DIGI*KV interaction term is -3.75, which is significant at the 1% level. This indicates that the KV index can inhibit the effect of digital transformation on enhancing the value of equipment manufacturing enterprises to some extent. Meanwhile, a higher KV index suggests lower quality of information disclosure. That is, the quality of information disclosure can positively moderate the relationship between digital transformation and the value of equipment manufacturing enterprises, thus validating Hypothesis H2.

Degree of government intervention.

In Table 2, Column 4, the dependent variable is the value of equipment manufacturing enterprises, and the independent variable is digital transformation. It can be seen that the coefficient of DIGI*Gov interaction term is 6.488, which is significant at the 5% level. This indicates that the degree of government intervention can promote the effect of digital transformation on enhancing the value of equipment manufacturing enterprises to some extent. In other words, the degree of government intervention can positively moderate the relationship between digital transformation and the value of equipment manufacturing enterprises, thus validating Hypothesis H3.

6 Conclusions

With the rapid development of digital intelligence technology, traditional industries are accelerating their transformation under the new normal of the economy. The rise of the service economy and intensified market competition have driven the digital transformation of manufacturing enterprises. This study selects A-share equipment manufacturing enterprises from 2003 to 2022 as a sample, obtains the degree of digital transformation through Python text analysis, and conducts empirical analysis to draw the following conclusions:

Digital transformation has a significant positive impact on the value of equipment manufacturing enterprises. Empirical research shows that the digital transformation of listed equipment

manufacturing enterprises from 2003 to 2022 can significantly enhance corporate value. Therefore, companies should accelerate their transformation, use digital technology to optimize production, service, and management to enhance their value;(2) The quality of information disclosure and the degree of government intervention positively regulate the value of equipment manufacturing enterprises in digital transformation. Enterprises should establish information sharing platforms, strengthen cooperation, and carefully plan digital reforms using preferential government policies to reduce transformation costs and enhance corporate value.

Due to the limitations of research resources and time, it may not be possible to conduct in-depth research on all relevant variables, or to cover all aspects and potential impacts of digital transformation. In the future, more rigorous data collection and processing methods can be adopted to reduce the impact of data errors and missing data on research results. At the same time, by introducing more explanatory variables, control variables, or adopting more advanced statistical methods, the complexity and dynamics of digital transformation can be more accurately captured.

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