

Digital Transformation and Enterprise Value -- Based on Empirical Data of Listed Companies in China

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Abstract. Enhancing corporate value is of significant importance for promoting sustainable and high-quality development. In the current era of informatization, digital transformation has become an indispensable path for corporate growth. This study uses financial and related data from Chinese A-share listed companies from 2010 to 2022 as samples to empirically examine the impact of digital transformation on corporate value. Based on the perspectives of environmental performance, social responsibility, and corporate governance, the study explores its operating mechanism. Empirical results indicate that digital transformation can promote the enhancement of corporate value through the pathways of environmental performance, social responsibility, and corporate governance. Furthermore, heterogeneous results suggest that, in terms of regions, the impact of digital transformation on corporate value is more significant in the eastern region. From the perspective of companies, the influence is more pronounced for those in the growth stage and with a proportion of party member executives exceeding 50%. The above results provide empirical evidence for a comprehensive understanding of the value effects of digital transformation and the mediating role of environmental performance, social responsibility, and corporate governance. It also offers valuable insights for enhancing corporate value.

Keywords: Digital Transformation, Corporate Value, Environmental Performance, Social Responsibility, Corporate Governance.

1. Introduction

Enterprise value is a key factor in measuring whether a company can operate smoothly and achieve sustainable development. It is also an important basis for assessing whether a company can achieve healthy and robust development in a competitive environment. From the perspective of the capital market, enterprise value serves as a crucial medium for stakeholders to comprehensively evaluate a company's overall strength, market prospects, and future development potential. With the rapid development of China's market economy, companies, as significant micro-entities in the market economic system, face the urgent question of how to enhance their enterprise value, which is also a focal point in academic research (D Walters., 2018).

In the current world undergoing unprecedented changes, technology plays an increasingly crucial role in economic development and industrial transformation, accompanied by the rise and prosperity of the digital economy. According to the "China Digital Economy Industry Development Report (2023)," the scale of the digital economy exceeded 50 trillion RMB in 2023, with the digital industrialization scale accounting for 41.5% of the GDP, making the digitalized industry a new growth point for the national economy. With the rapid development of the digital economy and the increasing maturity of digital technology, the economic environment is undergoing unprecedented changes, presenting both opportunities and challenges for companies. The digital economy enables companies to empower core businesses through digital technology, reduce production and operational costs, break down information barriers through data-driven approaches, and achieve efficient resource integration and utilization (Tapscott, 2008), thereby increasing product added value (M Halliday., 2021). Therefore, exploring how digital transformation can enhance enterprise value is of utmost importance.

While economic and technological advancements bring convenience to human life, we should also recognize the escalating issues of climate change, natural disasters, and environmental pollution. Governments worldwide are actively taking actions to address these challenges. For instance, in 2015,

178 countries formally adopted the Paris Agreement; in 2017, the Chinese government issued the "Notice on Winning the Three-Year Battle for Blue Sky Defense"; in 2020, the Japanese government released the "Climate Change Countermeasures Policy," arranging actions for global response to climate change after 2020. Investors and corporate behavior are influenced by government policies, and stakeholders, in the process of evaluating enterprise value, consider environmental performance as one of the assessment criteria. The use of digital technology and data analysis can help companies better manage and monitor energy consumption, innovate facilities, reduce the cost of environmental pollution, decrease corresponding expenses, and provide support for the sustainable development of enterprises (Qi Beibei., 2023). Additionally, environmental performance can enhance corporate image and reputation, attract investors and consumers, and improve the competitiveness of the company.

On the other hand, the rapid development of economic globalization and social media has led to more extensive reporting, promotion, and disclosure of corporate behavior. Corporate social responsibility, as one of the essential means for companies to contribute to the public, receives attention from news media, the public, and government departments worldwide (Feng Liting., 2022). Especially during the COVID-19 pandemic, corporate social responsibility has been frequently mentioned. Digital transformation, through the application of digital technologies such as the internet, seamlessly connects users with any object, enhances their information acquisition capabilities, reduces information asymmetry, and transaction costs (Wu Haiyan., 2022). Companies are more likely to attract investor investment, alleviate financing constraints, and provide sufficient space for funds and resources by actively fulfilling social responsibilities. This supports maintaining and improving corporate social responsibility performance, further promoting the fulfillment of social responsibilities, and actively fulfilling social responsibilities can establish a positive image for the company, increase visibility, contribute to building good supply chain relationships, gain public recognition, and enhance corporate performance (Sun Cunyi., 2018).

Since the beginning of the 21st century, events such as financial fraud at Enron, the bankruptcy of Lehman Brothers (the fourth-largest investment bank), and the financial crisis triggered by the subprime mortgage crisis in the United States have occurred frequently. Corporate governance has become a crucial factor influencing the survival of enterprises. In the process of management and supervision, companies have gradually introduced digital means, and the new management concepts and internal control methods contained in digital technology have gradually integrated into the daily operations and management of companies, making the management process of financial accounting and internal control more transparent (Zhao Jinmei., 2023). Companies with higher governance indices and levels can obtain higher market valuations (Fu Hua., 2018). Therefore, whether digital transformation can promote the enhancement of enterprise value through improving environmental performance, fulfilling social responsibility, and strengthening corporate governance is a critical question.

Based on this, this paper intends to use financial and related data from Chinese A-share listed companies for the years 2010-2022 as samples to empirically examine the impact of digital transformation on enterprise value. Furthermore, the study aims to explore the mechanisms through the perspectives of environmental performance, social responsibility, and corporate governance. The potential marginal contributions include the following three points:

(1) Enriched the research outcomes of digital transformation: Existing literature predominantly focuses on the impact of digital transformation on corporate performance (Wu Hongwei., 2023), business operations (Wang Lihua., 2023), and corporate management, emphasizing the economic consequences of digital transformation. However, the influence of digitization on enterprises is often comprehensive and multi-faceted. The study of its outcomes should be more holistic. Corporate value involves not only enterprise performance, management, and business scope but also financial indicators, brand value, innovation capability, strategic planning, human resources management, social responsibility, and sustainable development, among other aspects. Compared to other factors, it is more comprehensive. This paper explores the impact of digital transformation on corporate value,

providing new insights for governments and enterprises to enhance corporate value and promoting autonomous digital transformation by enterprises.

(2) Deepened the research on the impact of digital transformation on corporate value: Existing literature mostly examines the impact of digital transformation on corporate value from an internal perspective. This paper, however, considers both internal development and external contributions. It examines the impact of digital transformation on corporate value from the perspectives of environmental performance, social responsibility, and corporate governance, expanding the research in related fields. For the government, providing preferential measures for digital transformation, such as financial and tax incentives, low-interest loans, or financing support, can not only enhance corporate value but also promote improvements in environmental performance and social responsibility. For enterprises, digital transformation can improve internal production efficiency and service quality, fulfill social responsibilities more effectively, enhance governance levels, and thereby elevate the overall value of the company.

(3) Identified differences in the impact of digital transformation on corporate value concerning regions, life cycles, and party member executives: Based on this conclusion, when formulating policies for digital transformation, the government needs to consider the specific backgrounds and conditions of different enterprises. Understanding the current status and needs of enterprises in digital transformation is essential for more accurately supporting and promoting the digital transformation of enterprises, improving the effectiveness and feasibility of policies.

2. Theoretical analysis and formulation of research hypotheses

(i) Relationship between digital transformation and enterprise value

Digital transformation can enhance the quality of product innovation, thereby increasing enterprise value. Enterprises undergoing digital transformation demonstrate stronger connectivity and analytical capabilities, particularly in intelligent aspects. These enterprises deploy technologies capable of capturing more comprehensive information without human intervention and connect digital products through wireless communication networks. This facilitates interconnectivity between devices, improves customer experiences, and expands market share. Additionally, by collecting and analyzing sales data, production data, and inventory product data, companies can optimize and upgrade products in the early stages. This effectively improves the innovation quality of enterprise products, helps maintain competitiveness, increases product added value, enhances profitability, and subsequently increases enterprise value.

Digital transformation significantly improves production efficiency, thereby adding value to enterprise value. By introducing automated and intelligent technologies, equipment, workflows, and production systems, certain repetitive tasks can be delegated to machines, reducing the possibility of human intervention and errors. This simultaneously enhances production efficiency, lowers production costs and losses, leading to an increase in the level of corporate profits. For instance, the implementation of the Internet of Things (IoT) technology and big data analytics enables remote monitoring and predictive maintenance of equipment, reducing production line downtime. Companies can use "big data" to better collect market and customer data, analyze customer behavior and preferences, and promptly and effectively understand customer demands. This enables personalized product and service recommendations, facilitating customized and quantity-oriented production. This transformation alters the production and business models of companies, improving profitability.

Digital transformation, by optimizing resource allocation, enhances enterprise value. According to the resource-based theory, there are differences in resources between organizations. The embedding of digital technology allows various resources that were originally independently operated to be interconnected, forming a unique resource network for enterprises. This helps companies establish a distinct competitive advantage, promoting performance improvement. On one hand, the construction of online and network platforms for digital systems can structurally eliminate data gaps between

different levels within the company and information barriers between the company and the external environment. This achieves connectivity within the company vertically and horizontally, expanding the scope of information utilization. On the other hand, leveraging digital technologies such as big data and machine learning for processing collected information, companies can intelligently utilize vast amounts of data, enhancing their ability to acquire, integrate, and release resources, fully unleashing the potential value of data as a production factor. This, in turn, increases enterprise value.

Digital transformation helps alleviate information asymmetry issues, thereby enhancing enterprise value. Through digital platforms and tools, companies can share information and data in real-time, strengthening communication and collaboration among stakeholders. This reduces the material and time costs of information transmission, improves the efficiency and flexibility of the supply chain, and ultimately enhances enterprise value. Internally, digital transformation promotes an upgrade of the company's structural model towards higher transparency. Relying on open and transparent information and the coordinated cooperation of financial, material, and human resources, it strengthens information and communication within the organization, weakens opportunistic behavior, enhances the company's ability to perceive, predict, and prevent risks, creating a stable internal environment for performance improvement. Externally, digital transformation removes information bottlenecks between various links in the industrial chain, helping companies overcome information incompleteness and asymmetry. This achieves transparency, circulation, and sharing of information resources, facilitating comprehensive integration of supply chain resources, promoting collaborative synergy in production, supply, and sales, and facilitating precise matching of supply and demand. This, in turn, enhances enterprise value.

Therefore, we propose Hypothesis 1:

H1: The higher the level of digitalization in the enterprise, the more it can enhance enterprise value.

(ii) The intermediary role of corporate governance

Regarding internal control, on one hand, digital transformation allows for centralized or programmatic processing of various data and information within the enterprise. This provides scientific standards for employee performance assessment, operational norms, and job responsibilities. It enables better clarification of responsibilities and powers at various management levels during the internal control management process, promotes cooperation between different hierarchical levels, changes the way the enterprise operates and manages, enhances work efficiency and execution capabilities, forms a competitive advantage, and increases enterprise value. On the other hand, when enterprises use real-time tracking on digital technology platforms, the generation and operation of critical work information for financial and business department personnel leave a trace. This achieves end-to-end supervision of powers and responsibilities, enhancing the accuracy and real-time nature of supervision.

In terms of external supervision, digital transformation strengthens the attention of external stakeholders such as auditors and investors to the enterprise. Leveraging emerging digital technologies, external supervisors can more effectively monitor the operational activities of the enterprise, reducing instances of management abusing resources, improving the financial performance of the enterprise, and thereby increasing enterprise value. External supervision can also help enterprises reduce operational risks, avoid potential legal disputes and fines, and prevent unnecessary losses. This contributes to enhancing the robust operating image of the enterprise, creating a more favorable environment for sustainable development, and ultimately increasing the long-term value of the enterprise.

From the perspective of risk assessment, the application of digital technology allows the board of directors to have a clearer understanding of the company's true operating conditions. It enables effective identification and evaluation of potential risks, and the implementation of appropriate measures for risk prevention and response. Through digital transformation, management personnel can have real-time access to information such as procurement, production, sales, and inventory, gaining a clear understanding of the operating conditions and risks. This enhances predictive and responsive capabilities in the product market, reduces decision-making management risks in various

processes, and lays the foundation for the continuous operation of the enterprise, ultimately increasing enterprise value. Therefore, we propose Hypothesis 2:

H2: Corporate governance plays a positive mediating role in the relationship between digital transformation and enterprise value.

(iii) The intermediary role of social responsibility

Based on the theory of information asymmetry, digitization enables enterprises to disclose information more timely, accurately, and comprehensively, including financial statements, performance data, governance structure, etc. This enhances the timeliness of information, allowing stakeholders to effectively understand the operational and financial situation of the enterprise, thereby improving transparency and trust. Enterprises can establish relatively long-term cooperative relationships with stakeholders. On the other hand, information users such as governments, communities, employees, and consumers can form a supervisory collective. Faced with regulatory pressure, enterprises are inclined to fulfill their social responsibilities. For enterprises, this helps improve their reputation and image, attract more investors and customers, and can also reduce the cost and risk of financing, thereby enhancing the market value of the enterprise).

Furthermore, according to stakeholder theory, enterprises need to balance the demands of different stakeholders. When making business decisions, enterprises need to pursue shareholder interests while also considering and balancing the rights of different stakeholders, assuming political, social, and other responsibilities to gain recognition from stakeholders and society. This helps enterprises gain a good reputation, thereby maintaining or increasing their market value. Therefore, we propose Hypothesis 3:

H3: Social responsibility plays a mediating role in the relationship between corporate digital transformation and enterprise value.

(iv) The intermediary role of environmental performance

Based on the theory of voluntary disclosure, companies with better environmental performance are more willing to proactively convey their commitment to environmental protection through corporate websites, social media, and other channels to stakeholders. This demonstrates their commitment to protecting the environment, gaining investors' affirmation of the company's environmental performance, helping establish a positive corporate image, enhancing investors' trust in the company, thereby increasing the liquidity of securities. This process reduces the company's financing costs, increases its market share and revenue, ultimately enhancing enterprise value.

Digital transformation can help companies more effectively monitor and manage various business activities, including finance, human resources, and supply chain management. Through automated and intelligent management methods, companies can better comply with relevant regulations, reducing the risk of violations due to omissions or errors. By responding to stakeholder demands to maintain social legitimacy and adjusting strategic activities, companies can increase stakeholders' positive perceptions, including potential collaborators, improve their corporate image, and ultimately achieve more sustainable business development, thereby increasing enterprise value.

Therefore, we propose Hypothesis 4:

H4: Environmental performance plays a mediating role in the relationship between corporate digital transformation and enterprise value.

3. Data collection and research design

(i) Model construction and description of variables

To test hypothesis H1, we constructed the following model:

$$TBQ_{i,t} = \beta_0 + \beta_1 \times DT_{i,t} + \beta_j \times Controls_{j,i,t} + \sum Id_t + \sum Year + \varepsilon_{i,t} \quad (1)$$

Where the explanatory variable is firm value (TBQ), the dependent variable DT is digital transformation, is the corresponding coefficient, if it is significant and positive, it means that digital transformation has a positive impact on firm value; $Controls$ is the set of control variables selected

with reference to the existing studies, and denote the year dummy and company dummy variables, respectively; is the residual term.

Dependent Variable: Corporate Value. In this study, Tobin's Q value is considered as the measurement indicator for corporate value due to its objectivity and scientific characteristics, and its resilience to short-term decision-maker influences. As a common metric for assessing corporate performance, Tobin's Q value reflects stock price fluctuations in the external capital market, to some extent representing the market's feedback and expectations regarding the company's market value. On one hand, a higher Tobin's Q value implies that the company's market value exceeds its net asset value. On the other hand, a high Tobin's Q value may indicate the company's future profitability and growth potential, providing a relatively accurate measure of corporate value .

Explanatory Variable: Digital Transformation (DT) is the core explanatory variable in this study. Following the research method that the digital transformation is categorized into five dimensions: "artificial intelligence, block chain, cloud computing, big data." The frequencies of relevant terms appearing in the annual reports and management discussions of listed companies are calculated for each dimension. The results are then log-transformed after adding 1, yielding the measurement indicator for corporate digital transformation.

Mediating Variables: Based on the perspective of environmental performance, this study explores the mechanisms through which digital transformation affects corporate value. Therefore, environmental performance (EPI), corporate governance (CorpGov), and corporate social responsibility (CSR) are considered as intermediate variables and sequentially included in the model. There are two ways to measure environmental performance: one based on pollution fees, environmental taxes, and corporate environmental investments, and the other using environmental ratings from ESG (Environmental, Social, Governance) assessments. Due to the limited sample size of the former, this study adopts the latter. Social responsibility and corporate governance are also measured using ESG rating data. Currently, there are 10 institutions providing ESG ratings in China. Among them, HuaZheng started ESG rating the earliest (since 2009) and covers 27 issues, including over 300 specific evaluation indicators, making it more objective and comprehensive. Therefore, this study selects its rating data, assigning values from the highest AAA to the lowest rating C in a 9-1 order.

Table 1. Definitions of key variables

Variable type	Variable Name	Variable Code	Variable Definition
Dependent Variable	enterprise value	<i>TBQ</i>	Firm market value/current replacement cost
Independent Variable	Digital Transformation	<i>DTreport</i>	Frequency of digital transformation words in the annual report plus 1 to take the natural logarithm
		<i>DTdis</i>	Add 1 for natural logarithm of digital transformation word frequency in management discussions
Intermediary Variable	Environmental performance	<i>EPI</i>	Environmental performance ratings in ESG
	corporate governance	<i>CorpGov</i>	Corporate Governance Performance Ratings in ESG
	social responsibility	<i>CSR</i>	Social Responsibility Ratings in ESG
	asset-liability ratio	<i>LEV</i>	Total liabilities at end of period/total assets at end of period
	shareholding concentration	<i>Power1</i>	Shareholding ratio of the largest shareholder
Control Variable	R&D investment	<i>R&D</i>	R&D inputs in natural logarithms
	Net profit margin on total assets	<i>ROA</i>	Net profit/total assets x 100%
	Enterprise size	<i>CS</i>	Natural logarithm of total assets
	Net profit growth rate	<i>NPGR</i>	(Net profit for the current period - net profit for the previous period) ÷ Net profit for the previous period x 100%
	Political connection	<i>PC</i>	If any one of the chairman and general manager of the enterprise is or has been a government official, the value is 1, otherwise it is 0.

Control Variables: Drawing on existing research, this study selects leverage ratio (LEV), the proportion of shares held by the largest shareholder (Power1), research and development expenditure

(R&D), return on assets (ROA), firm size (CS), net profit growth rate (NPGR), and political connections (PC) as control variables.

For detailed definitions and measurement indicators of variables, please refer to Table 1.

(ii) Sample selection and data sources

This study focuses on A-share listed companies in China, using financial and related data from the years 2010 to 2022 as the sample. To ensure the authenticity and reliability of the results, the following measures were taken in this study: (1) Exclusion of ST*, ST, and PT-type listed companies; (2) Removal of samples with missing values for core variables; (3) Exclusion of financial companies; (4) To avoid the influence of outliers, truncation was performed at the 1st and 99th percentiles, resulting in a final sample size of 19,227 valid samples. The original data for digital transformation in this study comes from corporate financial annual reports and management discussion texts, while the environmental performance, corporate governance, and social responsibility rating data are sourced from the Wind database. All other data are obtained from the National Enterprise Credit Information Publicity System (NACIP).

4. Empirical results and analysis

(i) Descriptive statistical analysis

Table 2 presents the descriptive statistics of the main variables. The mean of corporate value (TBQ) is 1.84%, with a maximum of 5.29% and a minimum of 0.87%, indicating a relatively low average corporate value for listed companies in China and significant differences in corporate value among companies. The mean values of digital transformation (DTreport, DTdis) are 1.39% and 1.00%, respectively, with standard deviations of approximately 1.37 and 1.21, which are close to the statistics in existing literature. This result suggests noticeable variations in the level of digital transformation among different companies. This divergence might be attributed to the autonomy companies have in their digital transformation, varying initiation times, different stages of transformation, diverse nature of enterprises, and regional-industry disparities, all leading to distinctions in the digital transformation across different companies. It is worth noting that the maximum and minimum values of research and development (R&D) investment and total assets in the control variables show significant differences, indicating substantial variations in R&D investment and enterprise size among different companies.

Table 2. Descriptive statistics of main variables

Variables	N	mean	sd	min	max
TBQ	19,227	1.837	0.789	0.870	5.286
DTreport	19,227	1.385	1.369	0	5.011
DTdis	19,227	1.004	1.205	0	5.938
CSR	19,227	74.70	9.284	46.26	95.74
EPI	19,227	61.18	7.417	45.80	80.23
CorpGov	19,227	80.35	5.957	58.08	91.05
LEV	19,227	0.380	0.189	0.0479	0.820
NPG	19,227	0.487	2.742	-4.016	18.39
Power1	19,227	35.16	14.39	9.350	73.70
R&D	19,227	2.320	10.16	0	399.3
ROA	19,227	0.0558	0.0383	0.00287	0.197
PC	19,227	0.297	0.457	0	1
CS	19,227	159.0	799.2	2.550	27,332

(ii) Correlation analysis

The correlation coefficients between digital transformation (DTreport) and corporate value (TBQ) are 0.10, and they are statistically significant at the 1% significance level, indicating a preliminary positive correlation between the two. Further regression analysis can be conducted. Additionally, there is a significant correlation among the control variables: leverage (LEV), equity concentration (Power1), research and development investment (R&D), return on assets (ROA), company size (CS),

net profit growth rate (NPGR), and political connections (PC). Therefore, these variables are controlled for in the empirical test, enhancing the rigor of the study. However, it is noted that equity concentration, research and development investment, ROA, and other control variables are correlated with the independent variable. To address multicollinearity, a variance inflation factor (VIF) test is conducted on independent variables, mediator variables, and control variables. The results show that the VIF value for lnzchj is the largest, at 2.22, while the VIF values for the remaining variables are all below 2, indicating the absence of multicollinearity issues.

Table 3. Results of correlation test of main variables

	TBQ	DTreport	CSR	EPI	CorpGov	LEV	Power1	R&D	ROA	CS	NPG	PC
TBQ	1.00											
DTreport	0.10***	1.00										
CSR	0.01**	0.16***	1.00									
EPI	0.01	0.04***	0.33***	1.00								
CorpGov	0.09***	-0.03***	0.01***	0.08***	1.00							
LEV	-0.28***	0.00	0.07***	0.11***	-0.28***	1.00						
Power1	-0.09***	-0.09***	-0.04***	0.00	0.15***	0.06***	1.00					
R&D	-0.05***	0.19***	0.16***	0.18***	-0.04***	0.29***	0.02***	1.00				
ROA	0.36***	0.03***	0.08***	0.03***	0.23***	-0.41***	0.08***	0.05***	1.00			
CS	-0.30***	0.08***	0.14***	0.16***	-0.07***	0.59***	0.16***	0.58***	-0.14***	1.00		
NPG	0.02***	0.08***	-0.00	-0.00	-0.01	0.02***	-0.01	-0.01*	0.02***	-0.02***	1.00	
PC	-0.01*	-0.07***	0.01	0.03***	-0.00	0.00	-0.01	-0.05***	-0.02***	0.00	-0.03***	1.00

Note: ***, **, * indicate significance levels at 1%, 5%, and 10%, respectively; values in parentheses are t-values.

(iii) Digital transformation and enterprise value

Table 4. Digital transformation and enterprise value

Variables	(1) TBQ	(2) TBQ	(3) TBQ	(4) TBQ
DTreport	0.026*** (3.96)	0.037*** (5.95)		
DTdis			0.013** (2.03)	0.024*** (3.73)
LEV		0.771*** (14.39)		0.771*** (14.38)
Power1		-0.008*** (-9.31)		-0.008*** (-9.37)
R&D		0.044*** (4.70)		0.045*** (4.78)
ROA		5.486*** (32.73)		5.493*** (32.75)
CS		-0.294*** (-19.43)		-0.288*** (-19.12)
NPG		-0.007*** (-4.29)		-0.007*** (-4.31)
PC		-0.030** (-1.97)		-0.030* (-1.96)
Constant	1.905*** (44.75)	2.421*** (33.49)	1.909*** (44.85)	2.416*** (33.41)
Observations	19,227	19,168	19,227	19,168
R-squared	0.233	0.304	0.233	0.303
Number of id	3,884	3,882	3,884	3,882
Company FE	YES	YES	YES	YES

Note: ***, **, * indicate significance levels at 1%, 5%, and 10%, respectively; values in parentheses are t-values.

Table 4 examines the impact of digital transformation on corporate value. Columns (1) and (2) present the regression results of digital transformation and corporate value from the annual reports. It can be observed that, regardless of the inclusion of control variables, the estimated coefficient for digital transformation (DTreport) is consistently statistically significant at least at the 1% level, confirming Hypothesis H1, which suggests that digital transformation contributes to the enhancement of corporate value. This result is economically significant as well. Taking the results from column (2) as an example, the estimated coefficient for digital transformation (DTreport) is 0.037, indicating that for every 1 percentage point increase in the degree of digital transformation, corporate value increases by 0.037 percentage points. To ensure the reliability and robustness of the results, columns (3) and (4) present the regression results for digital transformation discussed by the management, where the coefficient for DTreportb is significant and positive, aligning with the findings in the first two columns, demonstrating the promotion effect of digital transformation on corporate value.

(iv) Mechanism of action tests

Table 5. Social responsibility, environmental performance, and corporate governance mechanisms test

Variables	(1) CSR	(2) TBQ	(3) EPI	(4) TBQ	(5) CorpGov	(6) TBQ
DTreport	0.262*** (3.37)	0.037*** (5.90)	0.108* (1.92)	0.037*** (5.94)	0.097* (1.79)	0.037*** (5.91)
CSR		0.001* (1.81)				
LEV	0.933 (1.40)	0.769*** (14.37)	-1.057** (-2.20)	0.771*** (14.41)	-9.466*** (-20.41)	0.795*** (14.66)
Power1	0.010 (1.01)	-0.008*** (-9.33)	0.009 (1.28)	-0.008*** (-9.32)	0.047*** (6.55)	-0.008*** (-9.45)
R&D	0.827*** (7.13)	0.043*** (4.59)	-0.021 (-0.25)	0.044*** (4.70)	0.035 (0.43)	0.044*** (4.69)
ROA	11.560*** (5.55)	5.472*** (32.62)	1.787 (1.19)	5.484*** (32.72)	8.921*** (6.14)	5.463*** (32.56)
CS	1.364*** (7.26)	-0.295*** (-19.50)	0.476*** (3.51)	-0.294*** (-19.44)	0.271** (2.07)	-0.294*** (-19.47)
NPG	-0.057*** (-2.64)	-0.007*** (-4.25)	-0.005 (-0.33)	-0.007*** (-4.29)	-0.024 (-1.62)	-0.007*** (-4.25)
PC	0.349* (1.84)	-0.030** (-1.99)	0.383*** (2.80)	-0.030** (-1.98)	0.076 (0.57)	-0.030** (-1.98)
EPI				0.001 (0.86)		
CorpGov						0.003*** (2.79)
Constant	65.008*** (72.40)	2.344*** (27.98)	57.570*** (88.95)	2.376*** (26.68)	86.044*** (137.40)	2.196*** (20.32)
Observations	19,168	19,168	19,168	19,168	19,168	19,168
R-squared	0.133	0.304	0.052	0.304	0.176	0.304
Number of id	3,882	3,882	3,882	3,882	3,882	3,882
Company FE	YES	YES	YES	YES	YES	YES

Note: ***, **, * indicate significance levels at 1%, 5%, and 10%, respectively; values in parentheses are t-values.

The results of the three mechanisms testing the impact of digital transformation on corporate value are presented in Table 5, with columns (1) and (2) focusing on social responsibility. In column (1), the regression result of digital transformation and social responsibility shows that the coefficient for

DTreport is 0.262, significant at the 1% level, indicating that companies implementing digital transformation can effectively enhance social responsibility. Column (2) reveals that, after incorporating social responsibility (CSR), the regression coefficient of digital transformation on corporate value (TBQ) remains significant and positive, suggesting that social responsibility plays a mediating role in the relationship between digital transformation and corporate value, thus verifying Hypothesis 2.

Columns (3) and (4) present the regression results with environmental performance as the mediating variable. In column (3), the coefficient for DTreport is 0.108, significant at the 10% level, indicating that digital transformation can improve environmental performance. In column (4), after including environmental performance (EPI), the regression coefficient of digital transformation on corporate value becomes non-significant. Further, using bootstrapping, the direct and indirect z-statistics are -3.32 and 2.96, respectively, with corresponding p-values of 0.001 and 0.003. This suggests that environmental performance plays both direct and indirect mediating roles in the relationship between digital transformation and corporate value, thus confirming Hypothesis 3.

Columns (5) and (6) present the regression results for digital transformation, corporate governance, and corporate value. In column (5), the coefficient for digital transformation is 0.097, significant at the 10% level, indicating that digital transformation positively influences corporate governance. In column (6), after introducing the mediating variable, both the coefficient for digital transformation (DT) and the coefficient for the mediating variable corporate governance (CorpGov) remain significant and positive. This implies that, through channel testing, as the degree of digital transformation increases, it empowers corporate governance, thereby driving the improvement of corporate value. This aligns with the theoretical derivation mentioned earlier, confirming Hypothesis 4.

5. Endogenous analysis

(i) Endogenous analysis

Table 6. Instrumental variables regression

Variables	DTreport	TBQ
IPR	0.0212494*** (22.21)	
DTreport		0.3102044*** (7.57)
LEV	-0.0458652 (-0.65)	0.7926767*** (12.40)
Power1	-0.0100614*** (-9.43)	-0.0063562*** (-5.72)
R&D	0.077314*** (6.37)	0.0030785 (0.26)
ROA	-0.5970717*** (-2.71)	5.117826*** (25.14)
CS	0.4379161*** (23.83)	-0.35036*** (-12.23)
NPG	0.0000597 (0.03)	-0.001374 (-0.66)
PC	-0.0542418*** (-2.71)	-0.0687252*** (-3.70)
Underidentification test		478.097***
Weak identification test		493.275***
Endogeneity test		38.663***

Note: ***, **, * indicate significance levels at 1%, 5%, and 10%, respectively; values in parentheses are t-values.

Given the potential endogeneity between digital transformation and corporate value, as well as the possibility of omitted variables, this paper conducted an endogeneity test, resulting in a P-value of 0.000, rejecting the null hypothesis, indicating the presence of endogeneity issues. To address endogeneity, this study referred to previous literature such as Song et al. (2020) and Zhang et al. (2021) and chose Internet penetration rate (IPR) as an instrumental variable. Two-stage least squares regression was employed, and the results are presented in Table 6.

Column (1) of Table 6 displays the results of the first-stage regression, where the instrumental variable is significant at the 1% level. This suggests that higher Internet penetration rates in the region where a company operates are associated with better digital development for the company. Additionally, the F-value exceeding 10 indicates the effectiveness of the instrumental variable. Furthermore, from the results in the second column, it can be observed that in the second-stage regression, the coefficient of digital transformation (DTreport) is significant at the 1% level and passes tests for over-identification and weak instrument, indicating that using the instrumental variable mitigates endogeneity issues and supports the conclusion that digital transformation enhances corporate value in this study.

6. Further analysis - heterogeneity analysis

In the descriptive analysis section, it was found that there are significant differences in digital transformation among companies of different natures and regions, which may lead to varying impacts on corporate value. Moreover, considering China's unique political and economic system, the role of party organizations in the production and business decisions of enterprises cannot be ignored. Therefore, this study, starting from the company's life cycle, the proportion of party member executives, and the region to which it belongs, grouped the samples based on the growth period, mature period, decline period, the proportion of party members (whether it exceeds 50%), and the east, central, and west regions, conducting separate regressions to verify heterogeneity. This is essential for a better understanding of the impact of digital transformation on corporate value.

The first three columns in Table 7 present the regression results for the growth period, mature period, and decline period. The results in the first column indicate that the coefficient of digital transformation (DTreport) for the corporate value in the growth period is significantly positive at the 1% level. The second column shows that the coefficient of digital transformation (DTreport) for the corporate value in the mature period is significantly positive at the 10% level. The third column reveals that the coefficient of digital transformation (DTreport) for the corporate value in the decline period is significantly positive at the 10% level. Comparing the three columns, it can be observed that the impact of digital transformation on corporate value is more pronounced for companies in the growth period than those in the mature period, and the mature period companies show a higher impact than those in the decline period. This difference could be attributed to the fact that companies in the growth period need to rapidly enhance their competitiveness and innovation capabilities to expand their market share. Digital transformation, by improving operational efficiency, optimizing processes, and enhancing data analysis capabilities, can contribute to increased market share and profitability. Companies in the mature period may face issues such as market saturation and declining profitability. Digital transformation can help them by optimizing existing products and services, exploring new markets, improving user experience, and enhancing brand influence, thereby increasing profitability and competitiveness, solidifying their position, and continuing development.

The regression for companies grouped by the proportion of party members in executive positions is presented in the middle two columns (4) and (5). Results indicate that the impact of digital transformation (DTreport) on the corporate value of companies with a party member executive proportion exceeding 50% is not significant. The author suggests that this may be because companies with a party member executive proportion exceeding 50% might be more influenced by political considerations than business interests in the decision-making process. This could limit the progress of digital transformation and consequently impact the growth of corporate value. In companies where

the party member executive proportion is below 50%, there may be more non-party member executives possessing the skills and experience required for digital transformation. These executives may be more familiar with the application and management of digital technology, contributing to better progress in digital transformation and positive outcomes.

The last three columns of the table represent the regression results for companies grouped by region. The results show that the impact of digital transformation on corporate value is significantly higher for companies in the eastern region than those in the central region, while there is no significant impact in the western region. The author suggests that this could be due to the eastern region having distinct advantages in economic development, technological innovation, and infrastructure construction compared to the central and western regions. Companies in the eastern region are closer to market, technology, and talent resources, making the impact of digital transformation more significant. The eastern region invests more resources in government-driven digital economic development and information construction, providing more policy support and incentive measures. This motivates companies in the eastern region to undertake digital transformation. On the other hand, the central and western regions may lack relevant policies and support, resulting in a lower degree of digital transformation. Additionally, the eastern region, compared to the central and western regions, is more likely to attract domestic and foreign capital and technological resources, providing more opportunities and conditions for digital transformation. The central and western regions may face difficulties in terms of investment, technology, and therefore have relatively weaker motivation for digital transformation.

Table 7. Tests based on growth cycle, proportion of party executives, different regions

VARIABLES	life cycle			Percentage of party executives		different regions		
	growing period	maturity period	recession	The proportion of party executives exceeds 50%	No more than 50% of party executives	eastern region	western region	central region
	TBQ	TBQ	TBQ	TBQ	TBQ	TBQ	TBQ	TBQ
DTreport	0.058*** (4.41)	0.025* (1.92)	0.021* (1.86)	0.003 (0.28)	0.036*** (4.82)	0.042*** (5.76)	0.005 (0.23)	0.027* (1.82)
LEV	0.769*** (7.20)	0.774*** (6.75)	0.525*** (4.92)	0.414*** (3.85)	0.771*** (12.12)	0.800*** (12.84)	0.628*** (3.19)	0.745*** (5.92)
Power1	-0.006*** (-3.40)	-0.007*** (-4.19)	- (-3.74) 0.006***	-0.006*** (-4.45)	-0.006*** (-5.69)	-0.007*** (-6.90)	-0.011*** (-4.08)	-0.008*** (-4.65)
R&D	0.046** (2.20)	0.019 (1.09)	0.035** (2.11)	-0.002 (-0.14)	0.085*** (6.69)	0.071*** (6.09)	-0.056** (-1.99)	0.020 (1.02)
ROA	6.131*** (17.08)	6.277*** (16.10)	4.743*** (13.96)	5.466*** (17.51)	5.529*** (27.87)	5.368*** (27.24)	5.985*** (9.72)	5.360*** (14.21)
CS	-0.277*** (-9.22)	-0.292*** (-9.14)	- (-14.15) 0.472***	-0.272*** (-9.24)	-0.329*** (-17.52)	-0.315*** (-17.20)	-0.269*** (-5.54)	-0.236*** (-6.84)
NPG	-0.011*** (-2.72)	-0.009** (-2.36)	-0.002 (-0.71)	-0.007** (-2.56)	-0.006*** (-3.00)	-0.007*** (-3.22)	-0.014** (-2.53)	-0.007** (-2.02)
PC	-0.057* (-1.72)	-0.015 (-0.48)	-0.031 (-1.20)	-0.048* (-1.91)	-0.041** (-2.15)	-0.011 (-0.58)	-0.123** (-2.17)	-0.040 (-1.24)
Constant	2.395*** (16.33)	2.652*** (17.41)	3.175*** (19.36)	2.619*** (19.26)	2.407*** (26.91)	2.456*** (28.70)	2.312*** (9.48)	2.393*** (14.09)
Observations	6,357	5,956	5,288	4,130	15,036	14,194	1,631	3,103
R-squared	0.314	0.332	0.391	0.303	0.320	0.322	0.243	0.283
Number of id	2,305	2,470	1,836	910	3,415	2,893	333	627
Company FE	YES	YES	YES	YES	YES	YES	YES	YES

Note: ***, **, * indicate significance levels at 1%, 5%, and 10%, respectively; values in parentheses are t-values.

7. Research findings and policy recommendations

This article uses financial and related data of A-share listed companies in China from 2010 to 2022 as a sample to empirically analyze the impact of digital transformation on corporate value and its mechanisms. The results indicate that digital transformation can enhance corporate value by improving environmental performance, governance levels, and social responsibility. Furthermore, the impact of digital transformation on corporate value is more significant in the eastern region, companies in the growth stage, and those with a party member executive proportion exceeding 50%. The research findings contribute to expanding existing literature and provide important insights for governments and entrepreneurs on how to effectively address the challenges of digital transformation and enhance corporate value.

Based on these conclusions, the article proposes the following four policy recommendations:

(1) The government should enhance guidance and supervision of digital transformation. On one hand, the government should increase its support for digital transformation. This can be achieved through various means, such as promoting the application of digital technology. This includes intensifying investments and construction in digital infrastructure, including network infrastructure and digital devices. By contributing to the construction of network infrastructure and providing relevant funds and policy support, the government can encourage operators to expand network coverage and enhance network speed. On the other hand, the government needs to strengthen the regulation of digital transformation. This involves establishing a sound legal environment and institutional framework for government regulatory platforms, ensuring the operability and feasibility of these platforms. Based on this foundation, establishing a sound governance system, improving administrative efficiency through technological upgrades, and realizing a positive interaction between the government and digital enterprises and organizations are crucial.

(2) For enterprises in the central and western regions, the government can provide more support and resources, create a favorable business environment, and attract more businesses and talents to these areas. This can be achieved by offering measures such as simplifying approval processes and ensuring land availability. Simultaneously, the government can establish digital transformation demonstration zones in the central and western regions. These zones would attract advanced enterprises and technologies from the eastern region, thereby facilitating the digital transformation of local businesses. Additionally, the government can promote cooperation and communication between different regions, encourage resource sharing and complementary advantages. Strengthening regional coordinated development can enhance the overall level of digital transformation for enterprises in the central and western regions, narrowing the gap with businesses in the eastern region.

(3) Digital transformation can enhance corporate value by improving environmental performance, social responsibility, and corporate governance. Firstly, companies should increase investment and development in digital technology to efficiently utilize resources, save energy, and reduce emissions of air, water, and solid waste. Collaboration with environmentally friendly suppliers, selection of materials and products complying with environmental standards, and promotion of sustainability across the entire supply chain can contribute to environmental conservation. Additionally, the use of big data and artificial intelligence technologies can aid in predicting and optimizing environmental impacts, enabling timely measures for environmental risk management. Secondly, companies should strengthen their awareness of social responsibility through digital transformation, aiming to enhance product quality, service levels, and consumer rights protection. Moreover, active participation in social welfare activities, improvement of employee benefits, and increased interaction between companies and society and the environment are crucial. Thirdly, companies should establish robust corporate governance structures, refine decision-making mechanisms for digital transformation, and standardize risk management and internal control processes during the digital transformation process. Furthermore, enhancing information disclosure and transparency, managing investor relations, and improving corporate image and reputation are essential for companies.

(4) Companies at different stages of the business life cycle should tailor personalized digital transformation plans. For companies in the growth stage, it is advisable to plan digital transformation

projects in advance to fully capitalize on market opportunities and enhance competitiveness. For companies in the mature stage, digital transformation can help improve operational efficiency, optimize internal processes, and explore new growth opportunities. Companies should assess their business models and strategies, incorporating digital transformation as part of an overall strategic adjustment to adapt to market changes and demands. For companies in the declining stage, digital transformation can assist in cost reduction, efficiency improvement, and the identification of new business models. These companies should prioritize the allocation of resources to optimize and enhance core business operations, ensuring sustainable development.

References

- [1] D Walters. (2018). Added value, enterprise value and competitive advantage. *Management decision*, 64 (7), 34–37.
- [2] M Halliday. (2021). Study the impact of growth, firm size, capital structure, and profitability on enterprise value: Evidence of enterprises in Vietnam. *Journal of Corporate*, 24 (1), 31–35.
- [3] Qi Beibei. (2023). Corporate governance, social responsibility information disclosure, and enterprise value in China. *Journal of Cleaner Production*, 14 (5), 22–23.
- [4] Feng Liting. (2022). Digital transformation: The evolution of the enterprise value chains. *Proceedings of Fifth International Congress*, 11 (3), 49–52.
- [5] Wu Haiyan. (2022). Digital transformation and metal enterprise value: Evidence from China. *Resources Policy*, 18 (4), 22–24.
- [6] Sun Cunyi. (2018). Tan Ronghua. Digital transformation, ambidextrous innovation and enterprise value: Empirical analysis based on listed Chinese manufacturing companies. *West Forum on Economy and Management*, 69 (7), 31–33.
- [7] Zhao Jinmei. (2023). The effect of digital transformation on manufacturing enterprise performance. *Amfiteatru Economic*, 18 (1), 11–15.
- [8] Fu Hua. (2018). Digital transformation, sustainability, and purpose in the multinational enterprise. *Journal of World Business*, 17 (3), 52–53.
- [9] Wu Hongwei. (2022). Digital transformation and enterprise sustainable development. *Borsa Istanbul Review*, 15 (3), 22–25.
- [10] Wang Lihua. (2023). Impact of enterprise digital transformation on capacity utilization: Evidence from China. *Finance Research Letters*, 48 (2), 29–30.