

# Digital Transformation, ESG Performance, and High Quality Development of Enterprises

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**Abstract:** This article selects Chinese A-share listed companies in Shanghai and Shenzhen from 2012 to 2022 as the initial research sample to empirically explore the impact mechanism and path of digital transformation on the high-quality development of enterprises. Research has found that digital transformation has a significant positive impact on the high-quality development of enterprises; ESG plays a mediating role in the process of digital transformation affecting the high-quality development of enterprises.

**Keywords:** Digital transformation, ESG performance, High quality development.

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## 1. Introduction

Driven by the 14th Five Year Plan and the dual carbon goals, China is accelerating the construction of a digital economy, digital society, and digital government, promoting the digital transformation of enterprises to enhance their competitiveness, innovation, and risk prediction capabilities. With the development of emerging technologies such as big data and the Internet of Things, digital transformation has become an important trend in enterprise development. It not only involves the updating and application of technology, but also relates to the fundamental transformation of enterprise operation modes and management mechanisms, providing important support for enterprises to achieve sustainable and high-quality development.

In addition, with the deepening of the concept of sustainable development, especially after the Chinese government clearly proposed and incorporated the goals of "carbon peak and carbon neutrality" into policy planning, the society's attention to environmental protection and social responsibility has reached an unprecedented level. ESG (Environment, Society, Governance), as an important indicator for measuring non-financial performance of enterprises, is becoming a key factor for external investors to evaluate investment risks and fulfill social responsibilities. In recent years, the Chinese government has implemented and implemented a series of policies to promote the ESG concept, aiming to enhance the social performance and economic value of enterprises, and thereby promote high-quality macroeconomic development. Therefore, studying how digital transformation and ESG performance affect the high-quality development of enterprises has strong practical significance. Based on this, this article takes Chinese A-share listed companies in Shanghai and Shenzhen from 2012 to 2022 as research samples, empirically exploring the impact and internal mechanisms of digital transformation on ESG performance and achieving high-quality development of enterprises, which expands the research perspective of high-quality development of enterprises.

## 2. Theoretical Analysis and Research Hypotheses

### 2.1. Digital transformation and high quality development of enterprises

Nowadays, digital transformation has become the core driving force for high-quality development of enterprises. Firstly, from the perspective of technological innovation, digital transformation has greatly promoted the improvement of enterprise production efficiency and product quality by introducing advanced information technology. The application of these technologies can significantly reduce production costs and improve resource utilization efficiency for enterprises, while increasing market share and profitability. Secondly, from the perspective of optimizing governance efficiency, digital tools make internal resource management more efficient, decision-making processes transparent and precise, which helps to enhance the flexibility and market adaptability of enterprises. Finally, from the perspective of resource allocation, digital transformation enables enterprises to allocate and utilize resources more accurately. Especially in the manufacturing industry, the application of digital technology has optimized inventory management, reduced inventory costs, and improved the liquidity and turnover efficiency of funds.

In addition, in optimizing corporate social responsibility practices and promoting the achievement of sustainable development goals. By utilizing technologies such as big data and cloud computing, enterprises can collect and analyze a large amount of data on environmental impacts, thereby more accurately assessing the impact of their business activities on the environment. These pieces of information not only help companies optimize their existing environmental protection measures, but also help them develop more effective long-term environmental strategies, which is precisely the high-quality development connotation of "green and sharing". Based on the above analysis, this article proposes Hypothesis 1: Digital transformation has a positive impact on the high-quality development of enterprises.

## 2.2. Digital transformation, ESG performance, and high quality development of enterprises

The introduction and application of advanced digital technology by enterprises will have a fundamental impact on their business models, production processes, and management methods. These impacts are not only directly reflected in improving operational efficiency and optimizing resource allocation, but also indirectly affect the total factor productivity of enterprises by improving their ESG performance. On the one hand, through data-driven resource management and intelligent production processes, enterprises can more effectively reduce energy consumption and waste emissions, and improve the efficiency of energy and raw material utilization. In this context, long-term investors are more willing to invest in companies with good ESG performance, thereby promoting green innovation and gaining market competitive advantages. In addition, digital transformation has optimized the corporate governance structure of enterprises. By establishing efficient information management systems and improving decision-making transparency, digital transformation helps enterprises improve internal control and supervision mechanisms, reduce agency problems, improve management efficiency, and promote high-quality development in governance. Therefore, based on the above analysis, this article proposes hypothesis 2: Digital transformation can drive high-quality development

of enterprises by improving their ESG performance.

## 3. Research Design

### 3.1. Samples and data

This article selects Chinese A-share listed companies from 2012 to 2022 as the research object and conducts the following sample screening: (1) Excluding ST and \* ST category companies during the data collection period; (2) Excluding financial industry enterprises; (3) Remove samples with missing key data; The final screening obtained 3964 enterprises and 19061 annual sample observations, with the sample data being imbalanced panel data. The data mainly comes from CSMAR, WIND, and CNRDS databases.

### 3.2. Variable definition

High quality development of enterprises (HQ) is the dependent variable, which refers to the approach of Tian and Ding (2023) and comprehensively measures both goals and processes. In terms of goal orientation, it mainly includes three sub dimensions: quality and efficiency, green development, and social sharing. In terms of process orientation, emphasize the importance of enterprise innovation, corporate governance, and risk management. Finally, the entropy method was used to determine the weights and comprehensive scores of various indicators for high-quality development of the enterprise, as shown in Table 1.

**Table 1.** Weighting measurement of high-quality development indicators

Primary indicators	Secondary indicators	Third level indicators	Weight(%)	
Quality benefits	Profitability	ROA	0.30	
	Growth ability	Revenue growth rate	0.58	
	Market performance	P/E ratio	Tobin Q	4.72
		Debt paying ability	Asset liability ratio	11.35
	Green development	Operational capability	Current ratio	13.60
			Total asset turnover rate	6.33
CNRDS ESG rating environment dimension score			7.11	
Social sharing	CNRDS ESG rating social dimension score		11.21	
Innovation driven	R&D intensity_ cost		8.49	
	R&D intensity_ personnel		6.33	
	R&D investment		1.94	
Risk management	R&D personnel		3.05	
	DiBo internal control index		7.07	
Corporate governance	ESG rating governance dimension score		13.60	

The variable boundaries, including explanatory and control variables, are shown in Table 2.

**Table 2.** Variable definition

Variable type	Variable Name	Variable symbols	Variable definition
Dependent variable	High quality development	Hq	Comprehensive calculation of scores for various indicators of high-quality development based on entropy method
Explanatory variable	Digital transformation	DCG	Based on the approach of Wu et al. (2021), the total word frequency of digital transformation is processed by adding 1 to take the logarithmic value
Mediating variable	ESG performance	ESG_Score	Assign a value of 1-9 to the ESG rating of Huazheng, taking the average of each quarter
Control variable	Enterprise scale	Size	Logarithmic processing of year-end total assets of enterprises
	Listing period	Lnage	Add 1 to the number of years the company has been

Cash flow ratio	Cflow	listed, and take the logarithm for processing Net trap flow generated from operating activities divided by total assets
Capital density	CD	The ratio of capital investment to labor investment
Equity balance	Top10	The shareholding ratio of the top ten shareholders
Institutional investor shareholding ratio	INST	Institutional investor shareholding ratio
Board size	Boardscale	The logarithm of the number of board members
Integration of two positions	Dual	If the chairman and general manager are the same person, take 1; otherwise, take 0
Nature of Property Rights	SOE	If the enterprise is a state-owned enterprise or a state- owned holding company, take 1; otherwise, take 0
Audit quality	Big4	Take 1 for the audit of the Big Four, otherwise take 0

### 3.3. Variable definition

Using Model (1) to test hypothesis 1, which examines the direct impact of digital transformation on the high-quality development of enterprises.

$$Hq_{it} = \alpha_0 + \alpha_1 DCG_{it} + \alpha_2 Controls_{it} + Year + Industry + \varepsilon_{it} \quad (1)$$

Among them, Hq is the dependent variable on the level of high-quality development of the enterprise, DCG is the core explanatory variable on the degree of digital transformation of the enterprise, Controls represents a series of control variables, Year represents time fixed effects, Industry represents industry fixed effects, represents model random disturbance term, i represents enterprise, and t represents year.

Setting models (2) and (3) to explore the mediating effect of ESG performance on digital transformation and high-

quality development of enterprises.

$$ESG_{it} = \beta_0 + \beta_1 DCG_{it} + \beta_2 Controls_{it} + Year + Industry + \varepsilon_{it} \quad (2)$$

$$Hq_{it} = \gamma_0 + \gamma_1 DCG_{it} + \gamma_2 ESG_{it} + \gamma_3 Controls_{it} + Year + Industry + \varepsilon_{it} \quad (3)$$

Indicates the annual average ESG performance score of company i in year t.

## 4. Empirical Analysis

### 4.1. Descriptive statistics

The results of descriptive statistical analysis are shown in Table 3. These variable statistics are basically in line with the relevant reality of Chinese listed companies.

Table 3. Descriptive statistics

Variable	Mean	Standard deviation	Minimum value	Maximum value
Hq	23.700	2.472	12.370	38.280
DCG	1.703	1.424	0.000	6.301
ESG Score	4.239	1.052	1.000	8.000
Size	22.340	1.284	17.810	28.640
Lnage	2.112	0.793	0.000	3.497
Cflow	0.057	0.069	-0.528	0.839
CD	2.283	2.815	0.088	289.900
Top10	0.410	0.185	0.104	0.979
INST	42.670	25.330	0.000	231.800
Boardscale	2.076	0.188	1.386	2.833
Dual	0.320	0.467	0.000	1.000
SOE	0.293	0.455	0.000	1.000
Big4	0.059	0.235	0.000	1.000

Note: The parentheses are for correcting standard errors, and the following text is the same.

### 4.2. Benchmark regression analysis

Table 4 reports the benchmark regression results. Column (1) in Table 4 shows a significant positive correlation between the level of high-quality development of enterprises and the degree of digital transformation at the 1% level, with a regression coefficient of 0.129. Furthermore, considering the impact of other factors on the high-quality development of enterprises, the results after adding control variables are shown in column (2). The level of high-quality development of enterprises is also significantly correlated with the degree of digital transformation at the 1% level, and the regression

coefficient increases to 0.154. In addition, in order to further improve the accuracy and precision of the model, industry fixed effects and time fixed effects were controlled by adding control variables. The results are shown in column (3), and digital transformation still has a significant positive impact on the high-quality development level of enterprises, with a regression coefficient of 0.164. When other influencing factors are constant, the higher the degree of digital transformation of an enterprise, the higher its level of high-quality development, which verifies hypothesis 1 in this article.

**Table 4.** Direct effect benchmark regression results

Variable	(1) Hq	(2) Hq	(3) Hq
DCG	0.129*** (0.026)	0.154*** (0.036)	0.164*** (0.035)
Control variable	NO	YES	YES
Time fixed effect	NO	NO	YES
Industry fixed effect	NO	NO	YES
Cons	23.481*** (0.045)	23.165*** (0.620)	22.928*** (1.176)
N	19,061	11,439	11,439
R2	0.002	0.007	0.055

### 4.3. Mediation effect test

Table 5 reports the results of the mediation effect regression. From column (2) of Table 5, it can be seen that the degree of digital transformation has a significant positive impact on enterprise ESG performance, with a regression coefficient of 0.062, indicating that high-level digital transformation can promote the improvement of enterprise ESG performance. Furthermore, ESG performance (ESG\_score) was introduced as a mediator variable on the basis of the original main regression model. The results are shown in column (3). After adding ESG performance as a mediator variable, the regression coefficient between ESG performance and the level of high-quality development of enterprises is positive and significant at the 1% level. Compared with the direct effects benchmark model, the regression coefficient of digital transformation has decreased from 0.164 to 0.157, but the significance remains unchanged. ESG plays a partial mediating role between digital transformation and high-quality development of enterprises. Therefore, hypothesis 2 of this article has been validated.

**Table 5.** Mediation effect regression results

Variable	(1) ESG_Score	(2) Hq
ESG_Score		0.122*** (0.035)
DCG	0.062*** (0.014)	0.157*** (0.035)
Control variable	YES	YES
Time fixed effect	YES	YES
Industry fixed effect	YES	YES
Cons	4.713*** (0.495)	22.345*** (1.150)
N	11,435	11,435
R2	0.044	0.057

### 4.4. Robust test

#### 1. Instrumental variable method

There is research indicating a potential endogeneity issue of reverse causality between digital transformation and high-quality development of enterprises. The higher the level of enterprise development, the more it will promote digitalization. On the one hand, high-quality enterprises usually have stronger financial strength and can invest in expensive digital technologies and infrastructure. On the other hand, enterprises with higher levels of development are

more willing to invest in digital transformation to maintain their market competitive advantages. Therefore, in order to alleviate potential endogeneity issues, this study used lagged data from enterprise digital transformation as instrumental variables and performed a two-stage least squares method for estimation. The results indicate that digital transformation still has a significant promoting effect on the ESG performance and high-quality development level of enterprises. The regression results are basically consistent with the previous assumptions, indicating that endogeneity issues do not affect the robustness of the research conclusions in this article.

#### 2. Replace the dependent variable

Although relying on a single total factor productivity to evaluate the high-quality development of enterprises has certain limitations. But usually, enterprises with higher total factor productivity have stronger market core competitiveness. At the micro level, the improvement of total factor productivity is seen as an important driving force for sustainable growth and high-quality development of enterprises. Therefore, this article uses the LP method to calculate the total factor productivity of enterprises as an alternative indicator to evaluate the level of high-quality development of enterprises for robustness testing. After changing the evaluation indicators for the high-quality development level of enterprises, the degree of digital transformation is significantly positively correlated with the total factor productivity of enterprises at the 1% level. The research conclusion of this article is still robust.

#### 3. Replace the explanatory variable

In order to further verify the robustness and credibility of the conclusions in this article, and to avoid accidental results caused by the selection of dependent variables. This article refers to the approach of Yuan et al. (2021) to conduct text analysis and statistical analysis of digital word frequency in enterprise annual reports. Considering that the length of the "management discussion and analysis" section of different enterprise annual reports is different, the total number of digital transformation word frequencies in enterprise annual reports divided by the total length of the MD&A section of the text is used as an indicator of the degree of enterprise digital transformation, and regression analysis is added to the benchmark model mentioned earlier. The results indicate that digital transformation is significantly positively correlated with the level of high-quality development of enterprises, and the conclusion is consistent with the previous text.

## 5. Conclusions and Recommendations

### 5.1. Conclusion

This article takes A-share listed companies in Shanghai and Shenzhen from 2012 to 2022 as research samples to explore the impact and internal mechanism of digital transformation empowering high-quality development of enterprises. Research has found that: (1) Digital transformation of enterprises has a significant positive impact on improving ESG performance and promoting high-quality development; (2) ESG plays an intermediary role in the mechanism of driving high-quality development of enterprises through digital transformation.

In the era of digital economy, how to adapt to the trend of accounting personnel training in the new era is a hot issue for educators. From the perspective of accounting education in universities, this paper discusses the impact of digital economy on the market employment, technology application and personnel training of accounting students, and puts forward some suggestions for accounting education in universities with the goal of cultivating compound accounting talents. These suggestions include cultivating compound accounting talents needed by digital economy, integrating production and education to shape digital accounting professional skills, embracing digital development to promote the transformation of accounting curriculum system, and combining new technology to innovate multi situational accounting teaching methods. The research conclusions provide ideas and reference for the transformation of accounting education in universities, and are greatly benefit to the realization of high-quality development in China in the era of digital economy from the perspective of talent cultivation and supply.

### 5.2. Recommendation

Firstly, in order to stimulate the potential of digital transformation in promoting high-quality development, the role of the government is crucial. Firstly, the government should focus on investing in key digital infrastructure such as

industrial internet and data centers, providing necessary technological and physical infrastructure support. Secondly, in the context of the digital economy, the government needs to strengthen the intellectual property protection of data assets to ensure effective protection of innovation and data security for enterprises in the process of digital transformation.

Secondly, digital transformation is increasingly becoming a key driving force for enterprises to comprehensively improve production efficiency and promote high-quality development. In this process, enterprises need to make significant investments in intelligent manufacturing and digital management, such as establishing smart factories and digital workflows. At the same time, they should also increase research and development expenses and comprehensively improve the intelligence level of traditional business chains.

Thirdly, from the perspective of enterprises, incorporating ESG into their strategic planning is crucial. Enterprises should integrate environmental friendliness and social responsibility into corporate governance, while considering market factors, and establish a positive corporate image with good ESG performance. This not only alleviates financing constraints, but also brings more funds for technological innovation and production efficiency improvement, ultimately achieving comprehensive efficiency growth and high-quality development of the enterprise.

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