

How Does Digital Transformation Shape New Competitive Advantages for Enterprises in the Export Market?

—An Analysis Based on Impact Effects and Multidimensional Transmission Pathways

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ABSTRACT

In this era of deep integration between globalisation and digitalisation, the digital wave is sweeping across the globe at an unprecedented pace. The synergistic deepening of digital industrialisation, industrial digitalisation, digital governance and data valorisation is profoundly reshaping the division of labour within global value chains. Against this backdrop, this study utilises observational data on Chinese listed companies on the Shanghai and Shenzhen A-share markets from 2012 to 2023 to construct a three-dimensional mediating transmission pathway framework, systematically investigating the impact effects and transmission pathways of digital transformation on corporate export competitiveness. Empirical findings indicate that digital transformation can significantly enhance firms' export competitiveness, and that it does so through the interplay of three dimensions: resource allocation, production operations and governance levels; simultaneously, this promotional effect exhibits marked heterogeneity in terms of property rights, production factors and geographical location.

KEYWORDS

Digital transformation; Export competitiveness; Three-dimensional transmission pathway; Mediating effect; Heterogeneity

1. INTRODUCTION

Driven by both the profound transformation of the global energy structure and the 'dual carbon' strategic objectives, digital transformation is reshaping the landscape of international corporate competition at an unprecedented pace and scale. China's digital economy is developing at a rapid pace. According to the *Report on the Development of China's Digital Economy (2023–2024)* published by the China Academy of Information and Communications Technology, the scale of China's digital economy reached 53.9 trillion yuan in 2023, representing a year-on-year increase of 7.39 per cent and accounting for 42.8 per cent of GDP, with its total scale firmly ranking second globally. However, compared with the industry's vigorous digital transformation efforts, systematic academic research into how this transformation empowers enterprises' international competitiveness—particularly in enhancing export competitiveness—remains lagging. Although numerous Chinese enterprises are actively utilising digital means to expand into international markets, the specific mechanisms and effects of digital transformation on enterprises' export competitiveness have not yet been fully elucidated in theoretical terms. At the same time, faced with the current trend of global supply chain restructuring, Chinese enterprises find themselves at a critical crossroads, urgently needing to seek breakthroughs amidst 'globalisation restructuring' and adaptive adjustments. Against this backdrop, this study examines, from the three perspectives of enterprise production and operational efficiency, resource allocation efficiency, and governance levels, how digital

transformation empowers enterprises to enhance their export competitiveness. Uncovering the underlying mechanisms through which it empowers export competitiveness, and thereby promoting the enhancement of Chinese enterprises' export competitiveness, holds significant theoretical value and practical significance.

2. LITERATURE REVIEW

2.1. Literature Review on Digital Transformation

By examining the micro-level mechanisms of corporate digital transformation, it can be observed that it exhibits distinct phased characteristics. The digital transformation of time-honoured enterprises follows a 'three-stage evolution': beginning with simple, piecemeal resource allocation to achieve isolated breakthroughs; progressing to an exploratory phase where open resource allocation is utilised to build digital value networks; and finally reaching a maturation stage where symphonic, shared resource allocation is employed to establish an ecosystemal layout [1]. Delving further into the underlying mechanisms, scholars such as Zhou Qing (2020) have identified the mechanisms through which digitalisation levels influence innovation performance [2], whilst Zhang Kai and Chen Jun (2025) point out that the digital transformation of manufacturing enterprises significantly enhances export resilience and accelerates the pace of recovery in corporate exports [3]. The mechanisms through which this occurs are primarily reflected in three aspects: the improvement in production efficiency proposed by Zhao Chenyu et al. (2021); the reduction in management costs identified by Qi Huajin et al. (2020) [5]; and the enhanced risk-bearing capacity examined by He Xiaogang et al. (2019) [6]. Broadening the scope to industrial chain collaboration, Wang Zhaomin (2025), building on research into supply chain digitalisation, argues that digital technology innovation by upstream enterprises significantly promotes the green transition of downstream enterprises through knowledge spillover effects, thereby enhancing green total factor productivity [7].

2.2. Research on Corporate Export Competitiveness

Relevant literature primarily examines the determinants of firms' export competitiveness. It is widely accepted in academia that domestic market competition and productivity influence export competitiveness; intense domestic market competition indirectly enhances export propensity by raising firms' total factor productivity, with capital-intensive industries exhibiting a particularly pronounced willingness to export. Guan Yiming and Fan Conglai (2025) point out that financial support and the internationalisation of banks have a positive effect on export competitiveness; in particular, the internationalisation of Chinese banks significantly increases firms' export competitiveness by reducing trade costs and alleviating financing constraints, with improvements in the quality of innovation playing a key role [8].

2.3. Research on the Impact of Digital Transformation on Firms' Export Competitiveness

In recent years, the impact of digital transformation on enterprises' export competitiveness has gradually become a focal point for both the academic community and policymakers. However, regarding the specific mechanisms through which digital transformation affects export competitiveness, the relevant literature exhibits certain differences in terms of research perspectives and the moderating role of external environments. Adopting different research perspectives, scholars have conducted diverse studies. Meng Xia and Dong Wenting (2022), drawing on an external environment perspective, argue that digital trade barriers weaken the promotional effect of digital transformation on export competitiveness [9]. From an industry perspective, Xu Xin and Sang Shuo (2023) examined differences across manufacturing sub-sectors, analysing industries with varying levels of technological intensity, and found that digital transformation has a particularly significant

effect on low- and medium-technology industries [10]. Furthermore, the study by Chen Weitao and Tang Ziwei (2024) focuses on the micro-enterprise level and finds that digital transformation enhances export competitiveness through the mediating effects of innovation efficiency, corporate governance and human capital levels [11].

2.4. Literature Review

Existing research on the relationship between digital transformation and corporate export competitiveness has established a relatively systematic theoretical framework; however, analyses of the underlying mechanisms tend to be rather one-dimensional. Most studies focus on a single traditional pathway, such as production efficiency or cost savings, whilst there is insufficient exploration of the interplay between two or more mediating mechanisms, leaving research gaps and scope for further investigation. In light of this, this study proposes a three-dimensional mediating analysis framework comprising ‘resource allocation, production operations and corporate governance’ to explore the synergistic effects among various key factors. Based on data from Chinese listed companies for the period 2012–2023, a multi-dimensional indicator system for corporate resource allocation efficiency is constructed. Employing empirical analytical methods, the study aims to uncover the transmission pathways through which digital transformation enhances corporate export competitiveness and, building on these findings, to provide policy recommendations.

3. THEORETICAL ANALYSIS AND RESEARCH HYPOTHESES

3.1. The Impact of Digital Transformation on Corporate Export Competitiveness

Digital transformation provides enterprises with new impetus for development. The current corporate ecosystem has gradually shifted towards digitalisation, networking and intelligent development, fundamentally transforming enterprises’ production and operational models as well as the innovation and development processes for new products. Furthermore, the application of digital technologies facilitates the integration of innovative outcomes into enterprise R&D and production processes, creating economies of scale and driving improvements in innovation efficiency and product quality. In the context of global competition, export strategies relying solely on low costs are unsustainable, whereas digitalisation provides a technological foundation for enterprise innovation. Finally, digital transformation can enhance enterprises’ adaptability to global markets and their resilience to risks; by monitoring changes in global trade policies in real time, enterprises can adjust their export strategies in advance and promptly switch to alternative approaches. Based on the above theoretical mechanisms, the following research hypotheses are proposed.

Hypothesis 1: Digital transformation can significantly enhance enterprises’ export competitiveness

3.2. Transmission Pathways through which Digital Transformation Empowers Enterprise Export Competitiveness

Resource allocation efficiency refers to the rationality with which enterprises allocate factors of production—such as labour, capital and technology—across production processes; the rational optimisation of these factors is the core link in enhancing export competitiveness. At the same time, the application of digital technologies enables enterprises to collect and integrate information on supply chains and market demand in real time, thereby reducing the degree of uncertainty in the allocation of production factors. Secondly, digital transformation can effectively break down information barriers, enhance sensitivity to forward-looking technologies, and thereby optimise resource allocation to meet market demand and reduce costs. Based on the above theoretical mechanisms, the following research hypotheses are proposed.

Hypothesis 2: Digital transformation enhances enterprises' export competitiveness by improving the efficiency of resource allocation.

Production and operational efficiency reflects a firm's ability to convert inputs into outputs and constitutes the 'micro-foundation' of export competitiveness. On the production line, firms can introduce intelligent and automated production equipment to promote greater flexibility in production processes, thereby achieving deep integration between digital technology and the manufacturing process [7]. At the same time, improved production efficiency ensures that enterprises can produce more goods within the same timeframe, whilst enhancing quality consistency, which directly boosts the supply capacity and credibility of export products. Furthermore, a significant improvement in operational efficiency can reduce certain operational costs, enabling enterprises to allocate more resources to the development of export markets, thereby enhancing their export competitiveness. Based on the above theoretical mechanisms, the following research hypothesis is proposed:

Hypothesis 3: Digital transformation enhances a firm's export competitiveness by improving production and operational efficiency.

Corporate governance refers to a firm's ability to align the interests of shareholders, management and employees through institutional arrangements such as equity structure, incentive mechanisms and oversight systems. Digital systems can break down export targets into quantifiable indicators and combine these with behavioural data for performance appraisal, thereby improving the accuracy of feedback on work outcomes and, consequently, optimising export decision-making. Based on the above theoretical mechanisms, the following research hypotheses are proposed:

Hypothesis 4: Digital transformation enhances a firm's export competitiveness by improving its level of corporate governance.

4. RESEARCH DESIGN

4.1. Model Construction

To examine the impact of digital transformation on a firm's export competitiveness, this paper incorporates digital transformation into the research framework for the development of import and export trade and constructs the baseline regression model as follows:

$$EC_{it} = \alpha_0 + \alpha_1 NUM_{it} + \sum \beta_j xControls_{jit} + \sum \lambda + \sum year + \varepsilon_{it} \quad (1)$$

In Equation (1), i represents the firm, t represents time; EC is the dependent variable, representing the firm's export competitiveness; NUM is the core explanatory variable, representing digital transformation; $Controls$ represents the various control variables adopted in the study; α_0 is the intercept term; $\sum \lambda$ is the individual fixed effect, $\sum year$ is the time fixed effect; ε_{it} is the random disturbance term.

To further investigate the mechanism through which new-quality productive forces enhance enterprises' export competitiveness, this paper draws on the research methodology of Wen Zhonglin et al. (2014) [12]. Using resource allocation efficiency, production and operational efficiency, and corporate governance levels as mediating variables respectively, and combining these with the baseline regression model, the following mediation model is constructed:

$$M_{it} = \alpha_0 + \alpha_1 NUM_{it} + \sum \beta_j xControls_{jit} + \sum \lambda + \sum year + \varepsilon_{it} \quad (2)$$

$$EC_{it} = \alpha_0 + \alpha_1 NUM_{it} + \alpha_2 M_{it} + \sum \beta_j xControls_{jit} + \sum \lambda + \sum year + \varepsilon_{it} \quad (3)$$

In Equation (2), M represents the mediating variables, whilst the dependent variable EC_{it} denotes the degree of digital transformation of enterprises i in t . In Equation (3), the mediating variables are incorporated into the baseline model, with other specifications remaining consistent with those of the aforementioned baseline regression model.

4.2. Variable Definitions

(1) Dependent variable

Enterprise export competitiveness (EC). This paper primarily analyses enterprise export competitiveness from the perspective of cost advantage. Drawing on the approach adopted by Ling Yun (2025) [13], cost advantage is used as a proxy variable for enterprise export competitiveness. The ratio of operating costs to operating revenue is employed to measure an enterprise's cost advantage; the smaller this ratio, the greater the cost advantage, indicating higher export competitiveness. In this study, the reciprocal of this ratio is taken to convert it into a positive indicator.

(2) Key explanatory variables

Degree of digital transformation (NUM). As there is a wealth of academic research on metrics related to digital transformation, this paper follows the approach adopted by Zhang Yongkun et al. (2021) [14], measuring a firm's level of digitalisation as the proportion of digital transformation-related intangible assets—as disclosed in the notes to the financial statements of listed companies—out of the total intangible assets at year-end.

(3) Control Variables

Drawing on existing relevant literature, the control variables selected in this paper include: return on assets (ROA), firm size (Size), debt-to-equity ratio (Lev), management shareholding ratio (Mshare), cash flow ratio (Cashflow), inventory-to-assets ratio (Inv), and the combined shareholding ratio of the top five shareholders (Shrcr3). The definitions of each control variable are shown in Table 1 below.

Table 1. Definitions of Control Variables

Variable Name	Symbol	Measurement Method
Return on Assets	ROA	Net profit divided by average total assets
Company size	Size	Logarithm of total assets
Debt-to-asset ratio	Lev	Total liabilities divided by total assets
Management shareholding ratio	Mshare	Number of shares held by management / Total number of shares
Cash flow ratio	Cash flow	Operating cash flow / Total assets
Inventory as a percentage of total assets	Inv	Inventory / Total current assets
Shareholding ratios of the top five shareholders	Shrcr3	Sum of the shareholding percentages of the top five shareholders

(4) Mediating variables

Resource allocation efficiency. Drawing on the methodology of Ni Tingting et al. (2022) [15], Equation (4) is constructed: first, the firm's optimal investment level for the current year is estimated; then, overinvestment is calculated to measure the firm's investment efficiency.

$$\begin{aligned} \text{Invest}_{jit} = & \beta_0 + \beta_1 \text{Growth}_{jit-1} + \beta_2 \text{Lev}_{jit-1} + \beta_3 \text{RoA}_{jit-1} + \beta_4 \text{Age}_{jit-1} \\ & + \beta_5 \text{Size}_{jit-1} + \beta_6 \text{Invest}_{jit-1} + \sum \text{Indu} + \sum \text{year} + \varepsilon_{jit} \end{aligned} \quad (4)$$

In this context, investment in fixed assets $Invest_{jit}$ represents the proportion of the original cost of fixed assets relative to total assets at the beginning of the period; $Growth_{jit-1}$ represents the growth rate of the enterprise's main business revenue; the debt-to-asset ratio Lev_{jit-1} represents the proportion of total liabilities relative to total assets; Roa_{jit-1} represents the return on total assets; Age_{jit-1} represents the age of the enterprise; $Size_{jit-1}$ represents the scale of the enterprise's total assets, measured as the natural logarithm of total assets; $Invest_{jit-1}$ represents the firm's fixed asset investment in year $t-1$, calculated as described above. $\sum Indu$ and $\sum year$ are industry and year dummy variables, respectively. When the residual in Equation (4) is greater than 0, the overinvestment measure $Overinvest$ takes a value equal to the residual, thereby quantifying the extent of the firm's overinvestment; if the residual is less than 0, this indicates underinvestment, in which case $Overinvest$ takes the value 0.

Operational efficiency. Drawing on the approach of Shen Kunrong et al., this paper uses the total asset turnover ratio (ATO) to measure a firm's operational efficiency.

Level of corporate governance. Following the approach adopted by Zhou Qian et al., this study employs principal component analysis to construct a comprehensive index covering supervision, incentives and decision-making to measure the level of corporate governance.

4.3. Data Sources

Based on the scientific validity, rationality and availability of the data, this paper selects companies listed on the Shanghai and Shenzhen A-share markets from 2012 to 2023 as the research sample. The following processing was carried out on the raw data: samples from the financial sector were excluded; all 'ST' and '*ST' samples were excluded; samples with missing values for relevant variables were excluded; and annual trimming was performed at the 1 per cent quantile. Following the above processing, 27,259 observations were obtained. Other relevant data were primarily sourced from the CSMAR database and the annual *China Urban Statistical Yearbook*.

5. EMPIRICAL ANALYSIS

5.1. Descriptive Statistical Analysis

A descriptive statistical analysis was conducted on each variable to gain a preliminary understanding of their basic characteristics. The results are shown in Table 2 below. It can be observed that there are disparities in the export competitiveness of different enterprises; the current export competitiveness of most enterprises is not high, with the average trend approaching the minimum value. At the same time, the degree of digital transformation across enterprises is also relatively low, with the average value at a low level. Furthermore, a variance inflation factor (VIF) test was performed on each variable, with a mean VIF of 1.30, indicating that there is no severe multicollinearity.

Table 2. Descriptive Statistical Analysis

Variable Name	Sample Size	Mean	Standard Deviation	Minimum	Maximum
EC	27,259	1.54	0.68	0.99	5.56
NUM	27,259	0.10	0.22	0	1
ROA	27,259	0.04	0.06	-0.22	0.21
Size	27,259	22.31	1.24	20.07	26.14
Lev	27,259	0.43	0.20	0.06	0.89
Mshare	27,259	13.30	18.53	0.00	66.64
Cash flow	27,259	0.05	0.07	-0.14	0.24
Inv	27,259	0.14	0.12	0	0.67
Shrcr3	27,259	51.35	14.96	19.45	86.51

5.2. Benchmark Regression Analysis

Table 3 below presents the results of the baseline regression analysing the impact of digital transformation on firms' export competitiveness. Columns (1) to (3) represent the direct regression, the regression with control variables, and the regression with industry and year fixed effects, respectively. As shown in Table 3, there are no substantial changes in the estimated coefficients or significance levels for the degree of digital transformation; the regression coefficients remain consistently positive and significant at the 1 per cent level. Therefore, Hypothesis 1 is supported, namely that digital transformation can significantly enhance firms' export competitiveness.

Table 3. Results of the benchmark regression

	(1) EC	(2) EC	(3) EC
NUM	0.154***	0.219***	0.0435***
	(8.24)	(12.70)	(3.22)
ROA		1.876***	1.426***
		(26.59)	(38.41)
Size		0.00132	0.0197***
Lev		(0.35)	(4.14)
		-0.812***	-0.189***
		(-33.19)	(-9.69)
Mshare		0.00167***	0.000735***
		(7.64)	(2.99)
Cash flow		0.852***	0.380***
Inv		(13.13)	(11.55)
		-0.220***	-0.270***
		(-6.69)	(-8.10)
Shrcr3		-0.000389	0.00155***
		(-1.48)	(5.67)
_cons	1.523***	1.754***	1.054***
	(339.27)	(22.42)	(10.17)
Individual fixed effects	NO	NO	YES
Time fixed effects	NO	NO	YES
N	27259	27259	27259
R ²	0.002	0.163	0.875
adj. R ²	0.002	0.163	0.855
F	67.93	663.0	370.6
Note: *, ** and *** indicate significance at the 10 per cent, 5 per cent and 1 per cent levels respectively; the figures in brackets are t-values. The same applies throughout.			

5.3. Robustness Tests

Table 4 presents the results of the robustness tests. Columns (1) to (3) indicate that, after controlling for additional omitted variables, altering the study period and incorporating provincial fixed effects, digital transformation still significantly enhances the export competitiveness of Chinese enterprises, thereby reaffirming Hypothesis 1. The results of these robustness tests show no significant differences from those of the baseline regression analysis, suggesting that the conclusions are robust.

Table 4. Robustness Tests

	(1) EC	(2) EC	(3) EC
Occupy	0.0164 (0.15)		
ListAge	-0.0212* (-1.66)		
lnstaff	-0.0468*** (-7.98)		
Growth	-0.00540 (-1.04)		
_cons	0.740*** (6.52)	1.091*** (8.14)	1.088*** (10.45)
Controls	YES	YES	YES
Individual fixed effects	YES	YES	YES
Time fixed effects	YES	YES	YES
Provincial fixed effects	NO	NO	YES
N	27259	17706	27259
R ²	0.876	0.886	0.876
adj. R ²	0.856	0.863	0.856
F	253.5	195.0	364.8

5.4. Endogeneity Test

A firm's digital transformation enhances its export competitiveness; however, firms with strong export competitiveness also possess abundant resources and a strong willingness to undertake digital transformation. Given that a firm's digital transformation may exhibit lag effects, this paper employs a one-period lagged dependent variable approach to address estimation bias arising from endogeneity.

Table 5. Test for Endogeneity

	(1)	(2)
	L.EC	L.EC
NUM	0.0580*** (2.63)	0.0444** (2.00)
_cons	1.538*** (285.08)	2.013*** (18.77)
Controls	YES	YES
Individual fixed	YES	YES
Time-fixed	YES	YES
N	18785	18785
R ²	0.000	0.006
adj. R ²	0.000	0.006
F	6.915	15.04

As shown in Table 5, the results of the endogeneity test indicate that when the dependent variable is lagged by one period, in Column (1) – where no control variables are included – the regression coefficient for digital transformation remains significantly positive at the 1 per cent level; in Column (2) – where control variables are included – the regression coefficient is significantly positive at the 5 per cent level. This further validates Hypothesis 1 of this paper.

5.5. Mechanism Testing

To further analyse the potential mechanisms through which digital transformation affects export competitiveness, this paper constructs a mediation regression model based on the preceding theoretical analysis to test the following three pathways. The results of the mechanism tests presented in Table 6 below validate the mechanisms through which digital transformation influences firms' export competitiveness.

(1) Production and operational efficiency

Columns (1) and (2) of Table 6 indicate that a firm's digital transformation has a significant positive impact on its production and operational efficiency, suggesting that as firms progress through their digital transformation journey, their production and operational efficiency continuously improves, thereby fostering a continuous enhancement of their export competitiveness.

(2) Efficiency of Resource Allocation

Columns (3) and (4) of Table 6 indicate that digital transformation has a positive impact on a firm's resource allocation efficiency, suggesting that digital transformation can also enhance a firm's resource allocation efficiency, thereby strengthening its export competitiveness.

(3) Corporate Governance

Table 6. Mechanism Testing

	(1) ATO	(2) EC	(3) Overinvest	(4) EC	(5) Gover	(6) EC
NUM	0.0189*	0.0468***	0.00887***	0.0423***	0.0296*	0.0435***
	(1.94)	(3.50)	(2.83)	(3.13)	(1.87)	(3.22)
ATO		-0.175***				
		(-19.46)				
Overinvest				-0.142***		
				(-5.06)		
Gover						0.00266
						(0.48)
cons	1.195***	1.263***	-0.508***	0.982***	-3.095***	1.062***
	(15.97)	(12.22)	(-21.12)	(9.39)	(-25.48)	(10.11)
Control variables	YES	YES	YES	YES	YES	YES
Fixed individual	YES	YES	YES	YES	YES	YES
Fixed time	YES	YES	YES	YES	YES	YES
N	27259	27259	27259	27259	27259	27259
R ²	0.832	0.877	0.694	0.876	0.913	0.875
adj. R ²	0.805	0.858	0.644	0.855	0.898	0.855
F	440.7	376.8	115.3	332.6	1043.9	329.4

Columns (5) and (6) of Table 6 indicate that corporate governance levels also play a positive mediating role in the process by which digital transformation promotes enhanced export competitiveness. This finding reveals that digital technologies are profoundly reshaping corporate governance systems. This comprehensive improvement in governance effectiveness establishes a

transmission mechanism that extends from the optimisation of internal management to adaptation to external markets, ultimately forming a key pathway through which enhanced governance levels are transformed into export competitive advantages, thereby effectively strengthening enterprises' capacity for sustainable development in international markets.

5.6. Heterogeneity Analysis

Building on this, we further analysed the heterogeneity in the impact of digital technology adoption on enterprises' export competitiveness. The sample enterprises were categorised into state-owned and non-state-owned enterprises according to their ownership structure; based on the 'Guidelines for the Classification of Listed Companies by Industry' (2012 revised edition) issued by the China Securities Regulatory Commission, enterprises in the sample were classified as technology-intensive or non-technology-intensive according to their factor intensity; and they were categorised into eastern, central and western regions according to the geographical location of their headquarters. The results of the analysis are presented in Table 7 below.

Table 7. Heterogeneity Analysis

	State-owned enterprises	Non-state-owned enterprises	Technology Intensive	Non-technology Intensive	Western	Central	Eastern
	(1) EC	(2) EC	(3) EC	(4) EC	(5) EC	(6) EC	(7) EC
NUM	0.035*	0.00893	0.058***	-0.0378*	0.191***	-0.0290	0.0320**
	(1.68)	(0.50)	(3.30)	(-1.78)	(3.64)	(-0.71)	(2.21)
_cons	1.099***	0.738***	0.901***	1.419***	0.260	1.304***	1.117***
	(6.48)	(5.40)	(6.93)	(8.20)	(0.75)	(5.20)	(9.38)
Control variables	YES	YES	YES	YES	YES	YES	YES
Fixed individual	YES	YES	YES	YES	YES	YES	YES
Fixed time	YES	YES	YES	YES	YES	YES	YES
N	8386	16408	13,988	13,232	3396	4,142	19,596
R ²	0.846	0.896	0.818	0.906	0.843	0.904	0.879
adj. R ²	0.821	0.877	0.788	0.889	0.817	0.887	0.859
F	121.7	223.2	222.2	165.8	60.69	68.41	239.1

Analysis of columns (1) and (2) in Table 7 reveals that the regression coefficient for digital transformation is significantly positive at the 10 per cent significance level for state-owned enterprises, but not significant for non-state-owned enterprises; An analysis of columns (3) and (4) in Table 7 reveals that the regression coefficient for digital transformation is significantly positive in technology-intensive enterprises, but not significant in non-technology-intensive enterprises; an analysis of columns (5), (6) and (7) in Table 7 reveals that, in both the eastern and western regional samples, the regression coefficient for digital transformation is significantly positive, indicating that it significantly enhances the export competitiveness of local enterprises.

6. RESEARCH CONCLUSIONS AND RECOMMENDATIONS

Based on data from Chinese listed companies between 2012 and 2023, this paper systematically elaborates on the theoretical foundations of how digital transformation influences corporate export competitiveness from three perspectives: resource allocation efficiency, production and operational efficiency, and corporate governance standards. Through empirical analysis, it comprehensively

examines the mechanism by which digital transformation affects corporate export competitiveness. Based on the research findings, the following recommendations are offered:

- (1) Promote the application of basic digital technologies. Enterprises should recognise the transformative opportunities presented by digital transformation and focus on the development and application of advanced digital technologies. Within the framework of traditional manufacturing models, they should build intelligent digital twin production systems by strengthening the empowerment of digital technologies and the allocation of innovative factors. This will enable the organic coordination of large-scale standardised manufacturing and flexible customised production, thereby providing technical support for the construction of a modern industrial system adapted to the new development paradigm.
- (2) Optimise the policy environment for resource allocation. Focusing on the intermediary role of resource allocation efficiency, refine policies governing the allocation of production factors. Deepen market-oriented reforms of production factors, break down sectoral barriers, and promote the free flow of capital, technology, data and other production factors. Promote the establishment of a data monitoring system for resource allocation.
- (3) Focus on enhancing production and operational efficiency; building on the intermediary role of such efficiency, promote the integration of digital technologies with production and operations. Establish a digital supply chain ecosystem; support leading enterprises in the sector to build technical collaboration platforms; and encourage small and medium-sized enterprises to participate in digital supply chains, thereby improving the efficiency and flexibility of industrial chains.
- (4) Refine corporate governance support policies to guide enterprises in establishing flat organisational structures, and use digitalisation to streamline decision-making processes, thereby ensuring that decision-making is data-driven and transparent.

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