Business Model Innovation Mediates Effect of the Relationship between Digital Technology Application and Supply Chain Concentration in China

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Abstract
Digital technology has demonstrated significant potential in driving economic development. However, international economic competition is becoming increasingly intense, the global situation is tense, and the economic environment is becoming more severe. As a result, the overall security and stability of the upstream and downstream supply chains have suffered significant damage. In this environment, firms are also actively looking for and exploring ways to alleviate the crisis, and digital technology shows outstanding ability in alleviating the supply chain crisis. We obtained the data from the annual reports of Chinese A-share listed manufacturing companies from 2019 to 2024 by using "Python" software, conducted multiple regression analysis using Stata software, and used literature analysis and empirical analysis to explore the impact of digital technology application on the concentration of supply chain of firms, as well as the mediating role of business model innovation in the process. and the mediating role of business model innovation. It is found that the application of digital technology can significantly reduce the supply chain concentration, and the application of digital technology gives rise to business model innovation based on digital technology, which makes the information asymmetry between firms and the upstream and downstream of the supply chain decrease and the communication and transaction efficiency increase, to reduce their supply chain concentration. The significance of the study is that it enriches the research on the path of the application of digital technology affecting the supply chain concentration of firms.
Keywords: Supply Chain Concentration, Digital Technology Application, Business Model Innovation

Introduction

In recent years, "digital economy", "digital transformation", and"digital technology" have long been a hot topic in the economic field. The new generation of digital technology represented by big data and artificial intelligence is in the stage of rapid development. In 2024, the added value of China's core digital economy industries accounted for 10% of the GDP, and the total volume of data production in China increased by 25% year-on-year. In the first quarter of 2025, the digital industry achieved business revenue of 8.5 trillion yuan, with a year-on-year growth rate of 9.4%, an increase of 4.4 percentage points compared to the same period of the previous year. Among them, the manufacturing and service sectors saw growth rates of 10.4% and 8.2% respectively, demonstrating a significant "digital empowerment" effect. The scale of China's digital economy remains the second largest in the world, and the digital economy is becoming more and more important in China.

Manufacturing is the cornerstone of national economic development, China's manufacturing development has made significant progress, but the development of large but not strong, strong but not new features are still very obvious, China's manufacturing firms are in urgent need of transformation and upgrading, the digital economy is more need for high-quality development (Pan et al., 2022).

At present, international industrial competition is becoming increasingly fierce, the global situation is tense, and the economic environment is becoming increasingly severe, so the risk of "chain breakage" facing the upstream and downstream of the supply chain is deepening, and the overall security and stability of the supply chain has suffered serious damage (Grosse et al., 2021).

Fewer articles study the relationship between digital technology application and supply chain concentration, and most of the articles study the internal mechanism of digital technology affecting the supply chain (Zhou et al., 2024), and focus on the impact on the entire supply chain, and do not conduct in-depth research on how digital technology application affects supply chain concentration. This study, on the other hand, refines the study of digital technology application on supply chain concentration and explores its transmission mechanism, which enriches the study of digital technology application on supply chain concentration of manufacturing firms and improves the study of its intermediate transmission mechanism, which can provide some inspiration and thoughts for firms to promote the application of digital technology and strengthen the intelligent management of upstream and downstream supply chains.

Literature Review
Digital Technology Applications
Digital technology is a technology that uses modern computers as a carrier to transform information such as graphics, text, sound, and images into a language that can be recognized by computers and then processed. Scholars have different definitions of digital technology. Digital technology is the combination of information, computing, communication, and connectivity technologies (Su & Wu, 2024). Digital technology refers to products or services embedded in ICT or incorporating information technology (Blichfeldt & Faullant, 2021). The digital economy uses digitized knowledge and information as a key factor of production. The importance of data as a factor of production is self-evident for physical manufacturing. Digital

technology influences, among other things, the production methods and organizational forms of firms (Forman & McElheran, 2025). and at the heart of digitization lies the application of digital technology and the reconfiguration of firms' businesses, processes, and organizations (Ritter & Pedersen, 2020). The organizational structure of firms in the industrialized era is mostly vertical, sectional and hierarchical pyramidal institutions, and digital technology application has prompted changes in the internal management of firms, breaking down organizational boundaries, and making organizational structures networked and flattened (Volberda et al., 2021).

Business Model Innovation in the Context of the Digital Economy
The definition of business model innovation has been interpreted differently in different dimensions, and from the technological innovativeness perspective. In the context of the digital economy, the business model of firms is changing; the past business model has been subverted, and the business model innovation in the Internet era requires consumers to participate in production and value creation, connecting vendors and consumers to co-create and share value (Peng et al., 2022). The value ecosystem as a new business model adopts advanced digital technology to open up the channels between the production end and the consumption end, and also establishes a platform for interaction and resource integration (Zheng et al., 2024). Firms are able to use business model innovation to tap the potential value of emerging digital technologies, create new value, and deliver it to consumers (Vaska et al., 2021).

Supply Chain Concentration
The concept of supply chain concentration was developed by Lanier (2010). He defined supply chain as the percentage of sales of the firm's largest customer to the firm's sales. Supply chain relationship is the relationship between suppliers and customers. Supplier concentration and customer concentration are the state of concentration of a firm's relationship with suppliers and customers (Kwak & Kim, 2020).

Digital Technology Applications and the Supply Chain
In the process of digital transformation, supply chain integration adds virtual cooperation to the traditional offline mode of cooperation, which is capable of transcending the limitations of time and space. The rapid intelligence of the business world is leading to dramatic changes in all parts of the supply chain. The application of digital technology affects the supply chain, involves many aspects of manufacturing, finance, and logistics (Xu et al., 2023). Digital technology can enhance digitisation in manufacturing, integrate high-quality resources to promote synergistic cooperation among all parties, so that the entire industrial internet does not need to rely entirely on the monopoly of one firm, thus promoting the coordinated operation of firms in the supply chain (Liu et al., 2012). Literature on digital technology and digital transformation has also gradually increased in recent years, but there is still less literature linking digital technology applications to supply chain concentration.

A Proposed Conceptual Framework and Research Hypotheses
Conceptual Model
The framework in Figure 1 describes the role of business model innovation as a mediating variable in the application of digital technology to supply chain concentration.
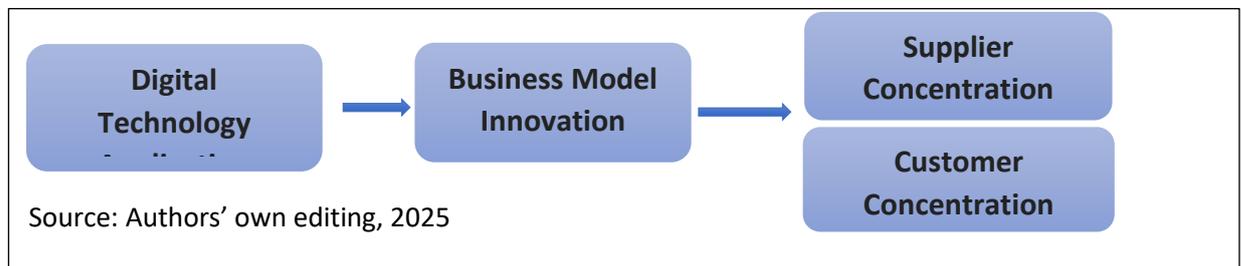

Source: Authors' own editing, 2025

Figure 1. The Proposed Conceptual Framework

Hypotheses Development
Digital Technology Applications and Supply Chain Concentration
In the long-term co-operation between the firm and its suppliers and customers, both parties will carry out mutual specialisation for the purpose of saving transaction costs and improving efficiency. Investments in specialised assets, which bind firms more firmly to suppliers and customers, are reflected in annual reports in increased supplier concentration and customer concentration. The deepening of ties between companies and their customers and suppliers has many negative consequences for companies, but digital technology has changed this.

From the customer's point of view, the use of digital technology can enable firms to receive real-time feedback, according to the front-end demand and suggestions to adjust the production plan, and the strategic layout of the firm, for service-oriented manufacturing firms. Through the analysis of massive user demand preference data, it can accurately carry out user profiling, master customer preferences, and large-scale personalised customisation becomes possible, and the firm thus obtains more potential customers. From the supplier's point of view, the use of digital technology can improve the problem of asymmetric information between the firm and the supplier, can quickly and efficiently mine and integrate supplier information, and improve the efficiency of searching for suppliers. Digital technology breaks down the information barriers between firms and customers, suppliers, so that firms can improve the efficiency of upstream and downstream transactions. Firms can do so in the pursuit of suppliers and customers' "quality" based on the pursuit of suppliers and customers' "quantity".

The application of digital technology can share data, guarantee the real and credible business, distributed ledger encrypted information, smart contracts to promote contract execution, data storage security, credible, traceable, firms based on the reduction of transaction costs, no information is not right into the choice to strengthen the cooperation with some of the fixed partners will weaken the incentives, the digital technology can make the firm and more companies to cooperate, so that can reduce the firm's own supplier concentration and customer concentration. Based on this, the research hypothesis is proposed:
H1: The application of digital technology can reduce the concentration of the supply chain and attenuate the negative effects of supply chain concentration.

Digital Technology Application and Business Model Innovation
In the industrial economic era, due to the objective geographical conditions and information asymmetry, the efficiency of firm cooperation was limited, so it was difficult for firms to realise the "one-to-many" or even "many-to-many" mode of cooperation. Digital technology has changed the previous mode of cooperation, enabling firms to develop new business models. The application of digital technology in business model innovation is crucial for organizational renewal and transformation, improving operational efficiency, customer engagement, and product launches, and ensuring long-term success and competitiveness. Business model innovation spawned by digital technology also improves the service level of firms. The high degree of penetration and innovation of digital technology has led to innovations in servitised models and enhanced service capabilities of firms, which ultimately contributes to the growth of business benefits. Digital technology drives business model innovation by creating new value, enhancing customer experience, and improving internal capabilities. Based on this, the research hypothesis is proposed:
H2: Digital technology application drives business model innovation.

Business Model Innovation and Supply Chain Concentration
The innovation of business models can build an efficient communication platform for firms and improve service level, so as to cooperate with more upstream and downstream firms in the supply chain and reduce the concentration of the supply chain. From the perspective of customers, personalised and flexible services can improve customer experience and customer loyalty, and recruit more customers for the firm. From the perspective of suppliers, it improves the efficiency of cooperation between the two sides and strengthens the willingness to cooperate. Business model innovation improves the cooperation efficiency of all parties in the transaction, so that the firm can ensure the quality of the transaction on the basis of development and increases the possibility of cooperation with more suppliers and customers to cooperate with the possibility of reducing the firm's own supplier concentration and customer concentration. Therefore, the research hypothesis is proposed:
H3: Business model innovation can reduce supply chain concentration.

Research Methodology
Sampling
Since 2019, China's economy has shifted from the stage of high-speed growth to the stage of high-quality development, which requires optimising the economic structure and transforming the growth momentum, and the digital transformation of firms has accelerated, and they have opened the reform of digitalisation, therefore, this study chooses to use the A-share listed manufacturing companies in China from 2019 to 2024 as a sample and treats the sample as follows:(1) Exclude the samples which are marked as ST or ST * samples. The financial data of the sample companies with abnormal status will affect the reliability of the regression results. (2) The samples listed in the current year are excluded. (3) To control the impact of outliers on the regression results, this study performs the shrinking of the panel data by 1% and 99%. (4) This study uses textual analysis to obtain the company's digital technology application by capturing the keywords about digital technology and its derivative technology in the annual reports of listed companies. In this study, the data on business model innovation is obtained by capturing the keywords of annual reports through Python software. The other relevant data are obtained from CSMAR database and the official website

of China Statistical Yearbook. The data processing software used in this study is Stata 18.0 and Excel.

Measures

We define our key variables used in this study as follows. Measurement of digital technology application refers to Chen and Srinivasan's (2019) method of extracting word frequencies of corporate digital technology application using the dictionary method for annual reports published by listed companies, where the high frequency of occurrence of a certain type of words in the text can reflect the user's level of concern about a particular issue, and the occurrence of certain high-frequency keywords convey the company executives' strategic intentions for the business. In order to avoid the serious right skew of word frequency affecting the regression results, this study chooses to carry out logarithmic processing after summing up the obtained word frequency numbers.

The measurement of the concentration of a firm's supply chain is divided into two specific indicators: customer concentration and supplier concentration. These are measured as follows: *(1)* customer concentration: the sales of a firm's top five customers are divided by the firm's annual sales for the year. *(2)* supplier concentration: the purchases of a firm's top five buyers are divided by the firm's annual purchases for the year.

To more accurately estimate the impact of digital technology applications on the supply chain concentration of manufacturing firms, this study selects several control variables: firm size, age, growth rate of revenue, audit opinion type, current asset turnover, equity multiplier, in addition to the above control variables, this study also controls for year and industry fixed effects. Also controls for year and industry fixed effects. To verify the impact of digital technology application on supply chain concentration, this study sets up the following model for testing:

$$Y_{i,t} = \alpha + \beta_1 digital_{i,t} + \beta_2 liqi_{i,t} + \beta_3 size_{i,t} + \beta_4 stock_{i,t} + \beta_5 growth_{i,t} + \beta_6 debt_{i,t} + \beta_7 aduit_{i,t} + \beta_8 age_{i,t} + \sum year + \sum ind + \varepsilon_{i,t}$$

Where I denotes the firm and t denotes the year. Y is the supply chain concentration, divided into supplier concentration (Supply) and customer concentration (Customer). Digital denotes the application of digital technology, which is the logarithm of the sum of word frequencies, size is the firm size, which is the natural logarithm of the firm's total assets at the end of the current year, age is the logarithm of the year from the firm's founding to the current year, growth is the rate of growth of operating revenues, liq is the turnover rate of current assets, and audit is the type of audit opinion, year is year fixed effect, ind is industry fixed effect, ε is residual.

Results and Discussions

Descriptive Statistics

Descriptive statistics of the main data were carried out using Stata 18.0 to provide a preliminary understanding of the distribution of the data. Table 1 describes the main variables, and the results are as follows: the gap between the maximum and minimum values of supplier concentration and customer concentration is large, and the supply chain concentration of manufacturing companies is relatively disparate. The core indicator digital has a mean value of 1.83, a minimum value of 0, and a maximum value of 4.543, which indicates that there is a gap between the degree of digitisation among manufacturing companies. There is a large gap

between the effects of the introduction of digital technology on digital benchmark companies and average companies.

Table 1
Descriptive Statistics

Variables	N	mean	p50	sd	min	max	range
Supply	9909	0.332	0.289	0.180	0.0700	0.895	0.826
Customer	9909	0.315	0.263	0.203	0.0360	0.915	0.879
digital	9909	1.830	1.792	1.206	0	4.543	4.543
liq	9909	1.148	0.978	0.714	0.219	4.356	4.137
size	9909	22.13	22.00	1.162	20.02	25.69	5.668
stock	9909	1.865	1.618	0.861	1.063	6.663	5.601
growth	9909	0.158	0.104	0.345	-0.481	2.055	2.536
debt	9909	0.392	0.383	0.185	0.0630	0.865	0.801
audit	9909	0.720	1	0.449	0	1	1
age	9909	2.133	2.197	0.764	0.693	3.296	2.603

All variables were treated with upper and lower 1% tail reduction

Correlation Analysis
Table 2 reports the correlation coefficient matrix. There is a significant correlation between the explanatory variable Digital Technology Adoption and the explanatory variable Supply Chain Concentration, which allows for the next step of multiple regression analysis.

Table 2
Correlation

	Supply	Custome	digital	liq	size	stock	growth	deb	audit	ag
Supply	1									
Custome	0.246**	1								
digital	-	-	1							
liq	0.058**	-	-0.132***	1						
size	-	-	0.104**	0.22***	1					
stock	-	0.00700	-0.026***	0.14***	0.37***	1				
growth	0.0160	0.050***	0.0060	0.06***	0.05***	0.03***	1			
deb	-	-0.0150	0.0110	0.20***	0.47***	0.85***	0.054*	1		
audit	-0.018*	-	-0.021**	0.10***	0.17***	0.07***	-0.0120	0.08***	1	
age	-	-	-0.068***	0.20***	0.45***	0.28***	-0.088**	0.31***	0.152**	1

Benchmark Regression

Table 3 presents the results of the relationship between digital technology application and supply chain concentration. In presenting the results, this study has chosen to use a progressive approach. In the first column of model (1), we choose to control the industry and time fixed effects, and the index coefficient of digital technology application (digital) is -0.0232, which passes the 1% statistical significance test, indicating that there exists a significant negative correlation between digital technology application and supplier concentration. Model (2) is to add a set of control variables on top of model (1), and the index of digital technology application (digital) is -0.0232, which passes the 1% statistical significance test, indicating that there exists a significant negative correlation between digital technology application and supply chain concentration. The significant negative relationship between digital technology application and supply chain concentration has not been affected. Models (3) and (4) examined the relationship between digital technology application and firm customer concentration, and the results show that they are all at the 1% level, presenting a significant negative relationship, thus assuming that there is a significant negative relationship between firm digital technology application and firm supplier concentration, thus hypothesis H1 is verified. This shows that the application of digital technology can significantly reduce supply chain concentration.

Table 3

Digital Technology Application and Supply Chain Concentration: Benchmark Regression

Variables	(1) Supply	(2) Supply	(3) Customer	(4) Customer
digital	-0.0232***	-0.0151***	-0.0258***	-0.0200***
	[-14.65]	[-9.77]	[-14.82]	[-11.62]
liq		0.0062**		-0.0266***
		[2.26]		[-8.71]
size		-0.0403***		-0.0318***
		[-22.39]		[-15.87]
stock		0.0286***		0.0113***
		[7.71]		[2.74]
growth		0.0231***		0.0371***
		[4.80]		[6.91]
deb		-0.1756***		0.0164
		[-9.47]		[0.79]
audit		0.0031		0.0043
		[0.85]		[1.05]
age		0.0049*		-0.0186***
		[1.96]		[-6.65]
Constant	0.3741***	1.2434***	0.3621***	1.0894***
	[111.59]	[34.23]	[98.48]	[26.93]
Year	YES	YES	YES	YES
Industry	YES	YES	YES	YES
Observations	9,909	9,909	9,909	9,909
R-squared	0.1415	0.2177	0.1883	0.2381
Adj. R-squared	0.1374	0.2134	0.1844	0.2339
F_value	214.5042	149.4748	219.5981	109.7491

t-statistics in brackets,*** p<0.01, ** p<0.05, * p<0.10

Further investigation on the relation between digital technology application, Business model innovation, and supply chain concentration. This study uses the number of word frequency of business model innovation keywords in the annual reports of listed companies in the manufacturing industry as an index to measure business model innovation, and the business model innovation keywords are as follows: B2B, B2C, C2B, O2O, Internet business model, innovative service model supply, business model innovation, and business model innovation. The word frequency totals are obtained and then logarithmised. This study uses the following model to test the mediating role of business model innovation in the following equation.

$$Y_{i,t} = a_1 digital_{i,t} + \theta \, control_{i,t} + \sum industry + \sum year + \varepsilon_{i,t}$$

$$Business_{i,t} = b_0 + b_1 digital_{i,t} + \theta \, control_{i,t} + \sum industry + \sum year + \tau_{i,t}$$

$$Y_{i,t} = c_0 + c_1 digital_{i,t} + c_2 Business_{i,t} + \theta \, control_{i,t} + \sum industry + \sum year + \omega_{i,t}$$

Table 4 reports the regression results of equations. Model (1) shows that digital technology application can significantly reduce supplier concentration. In model (2), the coefficients of digital technology application and business model innovation are significantly positively correlated, which indicates that digital technology application can promote business model innovation. Model (3), the coefficients between digital technology application and supplier concentration are significantly negative, and the regression coefficients of business model innovation are significantly negative, which indicates that business model innovation plays a mediating role in the relationship between digital technology application and supplier concentration.

Table 4
Digital Technology Application, Business Model Innovation, and Supply Chain Concentration

Variables	(1) Supply	(2) Business	(3) Supply	(4) Customer	(5) Business	(6) Customer
digital	-	0.0505***	-0.0142***	-0.0200***	0.0505***	-0.0189***
	[-9.77]	[21.27]	[-9.00]	[-11.62]	[21.27]	[-10.72]
Business			-0.0174***			-0.0226***
			[-2.65]			[-3.09]
liq	0.0062**	0.0026	0.0062**	-0.0266***	0.0026	-0.0266***
	[2.26]	[0.63]	[2.28]	[-8.71]	[0.63]	[-8.70]
Size	-	0.0162***	-0.0400***	-0.0318***	0.0162***	-0.0314***
	[-22.39]	[5.86]	[-22.20]	[-15.87]	[5.86]	[-15.67]
stock	0.0286***	0.0021	0.0286***	0.0113***	0.0021	0.0114***
	[7.71]	[0.37]	[7.72]	[2.74]	[0.37]	[2.75]
growth	0.0231***	0.0026	0.0232***	0.0371***	0.0026	0.0371***
	[4.80]	[0.35]	[4.81]	[6.91]	[0.35]	[6.92]
deb	-	-0.0050	-0.1757***	0.0164	-0.0050	0.0162
	[-9.47]	[-0.18]	[-9.48]	[0.79]	[-0.18]	[0.79]
audit	0.0031	-0.0036	0.0031	0.0043	-0.0036	0.0042
	[0.85]	[-0.63]	[0.84]	[1.05]	[-0.63]	[1.03]

age	0.0049*	0.0044	0.0050**	-0.0186***	0.0044	-0.0185***
	[1.96]	[1.13]	[1.99]	[-6.65]	[1.13]	[-6.62]
Constant	1.2434***	-0.3892***	1.2367***	1.0894***	-0.3892***	1.0806***
Constant	1.2434***	-0.3892***	1.2367***	1.0894***	-0.3892***	1.0806***
	[34.23]	[-6.97]	[33.97]	[26.93]	[-6.97]	[26.66]
Year	YES	YES	YES	YES	YES	YES
industry	YES	YES	YES	YES	YES	YES
Observations	9909	9909	9909	9909	9909	9909
R-squared	0.2177	0.1024	0.2183	0.2381	0.1024	0.2388
Adj. R-squared	0.2134	0.0974	0.2139	0.2339	0.0974	0.2346
F_value	149.4748	73.9138	133.7271	109.7491	73.9138	98.7021

Models (4)-(6) report the results of customer concentration as an explanatory variable. Model (4) indicates that digital technology applications significantly reduce customer concentration, and model (5) indicates that digital technology application contributes to firms' business model innovation. Model (6), the coefficients of digital technology application are significantly negative, and the coefficients of business model innovation are also significantly negative, and both of them pass the statistical significance test at the 1% level, which suggests that business model innovation is a potential mechanism for digital technology application to reduce supply chain concentration as a potential mechanism, thus hypothesis H2 and H3 is verified.

Robustness Test

Test in place of the explained variable. In order to test the stability of the above findings, the Supplier HHI and the Customer HHI were used as proxy variables for supplier concentration and customer concentration and is calculated as follows:

Supply-HHI = $\Sigma(x_i/X)^2$, where x_i denotes the purchases of the top five suppliers i of the firm and X denotes the total purchases of the firm for the year.

Customer-HHI = $\Sigma(y_i/Y)^2$, where y_i denotes the business revenue of the firm's top five customers i and Y denotes the firm's total business revenue for the year.

Table 5 shows the results of the regression equation between digital technology adoption and firms' supply chain concentration after replacing the indicators of the explanatory variables.

Table 5
Robustness Test

Variables	(1) Supply-HHI	(2) Customer-HHI
digital	-0.4249***	-0.5995***
	[-5.65]	[-7.05]
liq	0.5406***	-0.4095***
	[3.90]	[-2.61]
size	-1.0298***	-0.3260***
	[-10.87]	[-3.04]
stock	1.2066***	1.7822***
	[6.07]	[7.93]
growth	0.5115**	0.8508***
	[2.15]	[3.16]
deb	-5.7813***	-4.8624***
	[-6.17]	[-4.59]
audit	0.2005	0.0203
	[1.19]	[0.11]
age	0.5225***	-0.4765***
	[3.84]	[-3.10]
Constant	26.3336***	12.9943***
	[13.77]	[6.01]
Year	YES	YES
Industry	YES	YES
Observations	7032	7032
R-squared	0.1527	0.1207
Adj. R-squared	0.1465	0.1143
F_value	34.9101	23.6135

Table 5 shows that the coefficients of Digital Technology Adoption and Supplier-HHI and Customer-HHI are negatively correlated, which passes the test of statistical significance at the 1% level, indicating that there is a significant negative correlation between digital technology application and supply chain concentration. It can be seen that even after replacing the indexes for measuring firm supply chain concentration, the significant negative correlation that exists between digital technology application and supply chain concentration has not changed, and replacing the explanatory variables will not affect the estimation results of this study, and the results of this study are robust and reliable.

Endogeneity Test
In this study, the tool variable method is selected for processing. Referring to the traditional way of the academic community, this study uses the industry average excluding the company as the tool variable (Mean_digital). Table 6 reports the results of the first and second phases of the instrumental variable method. The model shows that the instrumental variable passed the weak instrumental variable test (Cragg-Donald Wald F statistic value is greater than the critical value). The tool variable is valid. After testing instrumental variables, the core point of this study is robust and reliable.

Table 6
Endogeneity Test

Variables	Phase 1	Phase 2	
	digital	Supply	Customer
Mean_digital	1.9285***		
digital		-0.0205***	-0.0377***
liq	-0.0334*	0.0061*	-0.0271***
size	0.1831***	-0.0391***	-0.0280***
stock	-0.0865***	0.0281***	0.0097**
growth	-0.0053	0.0228***	0.0380***
deb	0.1231	-0.1753***	0.0189
audit	-0.0076	0.0032	0.0039
age	-0.1112***	0.0044	-0.0204***
	[-7.05]	[1.61]	[-6.62]
Constant	-2.0876***	1.1282***	0.8948***
	[-9.17]	[25.57]	[18.23]
Year	YES	YES	YES
Industry	YES	YES	YES
Observations	9,865	9,865	9,865
R-squared	0.3130	0.2129	0.2276
Adj.R-squared	0.3098	0.2092	0.2240
F value	151.1567	59.8602	71.3799
Kleibergen-Paap rk LM statistic		577.782	
Cragg-Donald Wald F statistic		767.357	
Kleibergen-Paap rk Wald F statistic		379.065	

Findings and Conclusions
This study finds that digital technology application significantly reduces supply chain concentration in Chinese manufacturing firms. The effect is stronger in high-tech industries like electronics and machinery, while traditional sectors such as textiles show weaker impacts. Business model innovation mediates this relationship, especially in consumer-facing industries, where platforms like B2C and O2O enhance customer diversification. These findings suggest that digital transformation, when combined with innovative business models, helps firms reduce supply chain dependency. Industry-specific strategies are essential to maximize these benefits and support digital adoption across diverse manufacturing sectors. Future research could further validate the impact of digital transformation on supply chain concentration by conducting industry-specific analyses.

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