

Research on the Impact of Digital Transformation of Logistics Enterprises on Enterprise Performance

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Abstract : In the era of digital economy, it has become an inevitable trend for logistics enterprises to improve their performance through digital transformation and gradually become a research hotspot. This paper takes 164 logistics enterprises as samples and combines the dynamic capability theory to study the impact of digital transformation, dynamic capability and enterprise performance of logistics enterprises. The empirical results show that digital transformation has a positive impact on enterprise performance, and dynamic capabilities play a mediating role in the relationship between digital transformation and enterprise performance. This paper will theoretically expand the research on the impact of digital transformation on enterprise performance, and in practice will help guide logistics enterprises to improve their dynamic capabilities through digital transformation in a dynamic environment, thus improving enterprise performance.

Keywords: *Digital transformation, Dynamic capability, Enterprise performance*

I. INTRODUCTION

Emerging technologies such as big data, cloud computing and artificial intelligence have developed rapidly and continue to permeate all walks of life. New market opportunities and business models have emerged, which have a profound impact on enterprise operation and management. According to the White Paper on the Development and Employment of China's Digital Economy released by the Chinese Academy of Communications in 2021, by the end of 2020, the scale of China's digital economy has reached 39.2 trillion yuan, accounting for 38.6% of GDP, and more and more enterprises have adopted digital transformation strategies. Modern logistics plays a leading, fundamental and strategic role in building a modern circulation system, promoting the formation of a strong domestic market, and promoting the high-quality development of the national economy. However, at present, there are still problems of unbalanced and inadequate development, unreasonable allocation of logistics resource elements, and low efficiency of the whole chain operation. The application of digital technology is conducive to the integration of logistics resources and the optimization of the logistics industry structure. The digital transformation of logistics enterprises is imperative. Relevant practices show that some logistics enterprises can effectively reduce operating costs, open product markets and improve enterprise performance through digital transformation, but the research on the impact of digital transformation on enterprise performance of logistics enterprises is relatively scarce, and its internal impact mechanism needs to be further clarified. Dynamic capability theory is an important perspective to study the impact of digital transformation on enterprise performance. Therefore, this paper will deeply study the relationship between digital transformation, dynamic capability and enterprise performance of logistics enterprises, and provide feasible suggestions for

further promoting the digital transformation of logistics enterprises.

II. LITERATURE REVIEW AND RESEARCH HYPOTHESIS

A. Digital transformation and enterprise performance

According to the theory of organizational change, the digital transformation of enterprises refers to the transformation process in which enterprises realize the digitalization of all elements and links of enterprises by integrating digital technology and business management processes, thus promoting the reorganization of business processes and production methods. In the process of digital transformation, enterprises can use cloud computing, artificial intelligence and other digital technologies to build a decision-making system and control system based on data analysis, improve the accuracy and timeliness of decision-making, so as to reduce costs and increase efficiency, strengthen core business advantages, and increase enterprise profits[1]. The cultivation of internal learning atmosphere, open mind and common vision as well as the strengthening of cooperation between enterprises and their external networks play a positive role in regulating the relationship between enterprise digital transformation and enterprise performance[2]. The digital transformation of logistics enterprises can further improve the transmission efficiency of logistics supply chain, integrate logistics resources and improve enterprise performance. To sum up, this paper proposes the following assumptions:

H1: Digital transformation is positively affecting enterprise performance

B. Digital transformation and dynamic capabilities

Through digital transformation, enterprises can accumulate a large amount of data assets in their operations, and then cultivate and develop big data capabilities[3]. Big data analysis capabilities can significantly promote dynamic capabilities. Digital transformation is not only the process of solving the ossification of subjective and objective enterprise models, but also the process of organizational innovation, which helps to build organizational dynamic capabilities. Dynamic capability is the ability to detect external opportunities in a timely manner and make appropriate decisions quickly in a rapidly changing business environment, so as to reconstruct resources. It can be divided into perception ability, acquisition ability and reconstruction ability, and empirical research has found that digital transformation has a significant positive impact on dynamic capability[4]. In the process of digital transformation, logistics enterprises can use digital technology to enhance their perception of opportunities and threats, mobilize resources to deal with opportunities, and gain value, which also helps enterprises to continue to update. Therefore, this paper puts forward the following assumptions:

H2: Digital transformation is positively affecting dynamic capabilities

C. Mediation of dynamic capabilities

According to the theory of dynamic capabilities, the continuous updating of organizational practices promotes the organic matching of enterprise capabilities with strategic decisions and external environment[5]. Using dynamic capabilities helps enterprises design and maintain repeatable and sustainable practices in the constantly changing digital environment, improve the digital maturity of enterprises, and realize transformation through digital innovation[6]. Dynamic capabilities can improve the adaptability of enterprises to the changing external environment, help enterprises integrate existing resources and optimize resource allocation, enhance competitive advantages and improve enterprise performance. Specifically, the perception ability helps enterprises identify opportunities and threats in the changing environment; and provides good support for enterprise decision-making; Access to more different resources through digital technology to enhance the response speed to market demand, so as to optimize their own business processes and improve enterprise performance; Restructuring ability can improve enterprise performance by cultivating the enterprise's own resource restructuring ability, responding to the dynamic and changing market environment, and improving resource utilization. Therefore, this paper puts forward the following assumptions:

H3: Dynamic capability has a positive impact on enterprise performance

H4: Dynamic capabilities play an intermediary role between digital transformation and enterprise performance, that is, enterprise digital transformation improves enterprise performance by strengthening dynamic capabilities

To sum up, this paper constructs the intermediary path of "digital transformation - dynamic capability - enterprise performance", aiming to explore the mechanism of digital transformation of logistics enterprises to improve enterprise performance from the perspective of dynamic capability theory (Fig. 1).

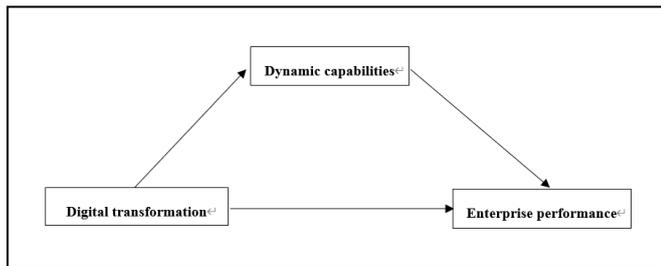


Fig. 1. Conceptual Model

III. RESEARCH DESIGN

A. Data source and sample

Most of the scales used in this paper are from English documents, which are translated from English to Chinese, and bilingual experts are invited to translate back. Select the questionnaire star platform to conduct formal research, limit the industry of the enterprise to logistics industry, and fill in the position of middle and high level managers. A total of 170 questionnaires were distributed, and 164 valid questionnaires were recovered, with a recovery rate of 96% (Table I).

TABLE I. SAMPLE DISTRIBUTION CHARACTERISTICS

Descriptive Measure	Category	Proportion (%)
Education	Doctor or above	0.61
	Master	20.12

Enterprise nature	Undergraduate	49.39
	Junior college and below	29.88
	State-owned enterprise	35.37
	Private enterprise	54.27
	Collective enterprises	4.88
	Sino-foreign cooperation or joint venture	1.22
Business type	Other	4.27
	Transport type	21.95
	Warehousing type	12.8
	Comprehensive service type	62.2
Size	Other	3.05
	Less than 20 people	3.05
	20-300 people	50
	300-1000 people	24.39
Age	More than 1000 people	22.56
	Less than 5 years	7.32
	5-10 years	26.22
	11-20 years	28.66
Position	More than 20 years	37.8
	Senior management	22.56
	Middle managers	47.56
	Grass-root managers	14.02
	General staff	15.85

B. Variable measurement

In order to ensure the reliability and validity of the study, this paper combs the relevant literature published at home and abroad, selects the mature variable scale that has been used repeatedly, and uses Liket7 scoring method (Table II). In terms of control variables, it is believed that enterprise size, enterprise age, enterprise nature, and business type are the influencing factors of enterprise performance, which are used as the variables to control the organizational situation in order to obtain stable research conclusions.

TABLE II. MEASUREMENT ITEMS OF VARIABLES

Variable	Measurement Items
Digital transformation	The enterprise uses digital technology to upgrade logistics services
	The enterprise provides logistics services based on digital technology
	Our company is transforming into a digital enterprise
	The enterprise believes that the adoption of digital technology and digital management is conducive to the development of the enterprise
Dynamic capabilities	The company is willing to spend energy to promote and publicize digital skills and management knowledge
	The enterprise can identify development opportunities from changes in the external environment
	The enterprise is good at integrating a large number of resources for enterprise development
	The enterprise can respond quickly to customer needs
Enterprise performance	The enterprise can seize the opportunity to quickly respond to changes in the external environment
	Compared with major competitors, the net profit of the company has been growing rapidly
	Compared with major competitors, the Company's return on assets is high
	Compared with major competitors, the company has a high rate of return on investment
	Compared with major competitors, the sales growth rate

of the enterprise is fast
Compared with major competitors, the service of our company has a high market share
Compared with major competitors, the overall competitiveness of the enterprise is strong
It is expected that the enterprise's new products and business will continue to grow

capability, H3 of dynamic capability and enterprise performance, and H4 of dynamic capability mediation.

1) Test of the relationship between digital transformation and enterprise performance

The independent variable (digital transformation) of this study is used as the explanatory variable, and the dependent variable (enterprise performance) is used as the explanatory variable. Regression analysis is conducted to verify the relationship between the two. The results show that, on the basis of only control variables, enterprise size, enterprise age, enterprise nature and business type have no significant impact on enterprise performance; On the basis of adding control variables, at the level of $P < 0.01$, the regression coefficient of digital transformation on enterprise performance is 0.537, which proves that digital transformation has a positive impact on enterprise performance. The hypothesis H1 in this study is valid (Table V).

TABLE V. TEST OF THE RELATIONSHIP BETWEEN DIGITAL TRANSFORMATION AND ENTERPRISE PERFORMANCE

Variable	Enterprise Performance			
	Model 1		Model 2	
	β	t	β	t
Enterprise size	0.047	0.562	0.098	1.374
Enterprise age	0.040	0.456	0.045	0.604
Enterprise nature	0.118	1.402	0.054	0.756
Business type	-0.098	-1.201	-0.071	-1.023
Digital transformation			0.537	7.990***
R ²	0.029		0.308	
F	1.171		14.075***	

^b ***: $P < 0.01$; **: $P < 0.05$; *: $P < 0.1$

2) Test of the relationship between digital transformation and dynamic capabilities

The independent variable (digital transformation) of this study is taken as the explanatory variable, and the intermediary variable (dynamic capability) is taken as the explanatory variable. Regression analysis is conducted to verify the relationship between them. The results show that, on the basis of only control variables, enterprise size, enterprise age, enterprise nature and business type have no significant impact on dynamic capacity; After adding control variables, at the level of $P < 0.01$, the regression coefficient of digital transformation to dynamic capability is 0.798, which proves that digital transformation has a positive impact on dynamic capability, and the hypothesis H2 in this study is valid (Table VI).

TABLE VI. TEST OF THE RELATIONSHIP BETWEEN DIGITAL TRANSFORMATION AND DYNAMIC CAPABILITIES

Variable	Dynamic Capabilities			
	Model 1		Model 2	
	β	t	β	t
Enterprise size	-0.095	-1.130	-0.019	-0.375
Enterprise age	0.015	0.168	0.022	0.415
Enterprise nature	0.148	1.758	0.053	1.038
Business type	-0.035	-0.436	0.005	0.102
Digital transformation			0.798	16.709***
R ²	0.033		0.650	
F	1.337		58.780***	

C. Reliability and validity test

SPSS26.0 and AMOS226.0 software were used for statistical analysis, and the Cronbach's a coefficient and combined reliability (CR) values of each variable were greater than 0.8, indicating high internal consistency and good reliability. In terms of validity, the convergence validity of each latent variable is tested by confirmatory factor analysis (CFA), and the standard factor load value of all items (λ) Both were greater than 0.55, and the average extraction variance (AVE) values were greater than 0.6, indicating that the aggregate validity of the questionnaire was good. Therefore, the reliability and validity of the scale used meet the requirements (Table III).

TABLE III. TABLE STYLES

Variable	N	Cronbach's a	CR	Min Factor loading	AVE
Digital transformation	5	0.928	0.899	0.703	0.642
Dynamic capabilities	4	0.947	0.922	0.584	0.746
Enterprise performance	7	0.968	0.946	0.690	0.714

IV. EMPIRICAL RESULTS AND ANALYSIS

A. Correlation analysis and multicollinearity test

The data were described and analyzed by SPSS26.0 software. Table IV shows the correlation coefficient matrix and variance expansion factor among the variables, and reports the descriptive statistical analysis results including mean and standard deviation. It can be found that the correlation coefficient between digital transformation, dynamic capability and enterprise performance is 0.720 and below, and there is a significant correlation, which provides preliminary support for regression research; Combined with the VIF value of each variable is far less than the critical value of 10, it shows that there is no serious multicollinearity problem in the regression model.

TABLE IV. CORRELATION ANALYSIS AND VARIANCE INFLATION FACTOR ANALYSIS

	1	2	3	4	5	6	7	VIF
1	1							1.172
2	.279**	1						1.290
3	-0.005	-.365**	1					1.187
4	0.149	.267**	.152**	1				1.091
5	-0.09	-0.134	0.092	.576**	1			2.926
6	-0.093	-0.116	0.121	-0.091	.720**	1		3.450
7	0.13	-0.01	0.106	-0.138	.305**	.526**	1	2.045
Mean	2.680	2.990	1.860	2.500	4.117	3.994	3.696	
S.D.	0.842	0.992	0.955	0.840	0.764	0.807	0.769	

^a ** represents $p < 0.01$, * represents $p < 0.05$, two-tailed test. 1. Enterprise scale; 2. Enterprise age; 3. Enterprise nature; 4. Type of business type; 5. Digital transformation; 6. Dynamic capability; 7. Enterprise performance.

B. Hypothesis test

This paper uses the multiple regression method to test the hypothesis proposed above, and uses SPSS26.0 to test the hypothesis H1 of digital transformation and enterprise performance, H2 of digital transformation and dynamic

c. ***:P<0.01; **:P<0.05; *P<0.1)

3) Test of the relationship between dynamic capability and enterprise performance

The intermediary variable (dynamic capability) of this study is taken as the explanatory variable, and the dependent variable (enterprise performance) of this study is taken as the explanatory variable. Regression analysis is conducted to verify the relationship between them. The results show that, on the basis of only control variables, enterprise size, enterprise age, enterprise nature and business type have no significant impact on enterprise performance; After adding control variables, it proves the role of dynamic capability on logistics enterprise performance. At the level of P<0.01, the regression coefficient of dynamic capability on enterprise performance is 0.696, which proves that dynamic capability has a positive impact on enterprise performance. The hypothesis H3 in this study is valid(Table VII).

TABLE VII. TEST OF THE RELATIONSHIP BETWEEN DYNAMIC CAPABILITY AND ENTERPRISE PERFORMANCE

Variable	Enterprise Performance			
	Model 1		Model 2	
	β	t	β	t
Enterprise size	0.047	0.562	0.113	1.859
Enterprise age	0.040	0.456	0.030	0.470
Enterprise nature	0.118	1.402	0.015	0.248
Business type	-0.098	-1.201	-0.073	-1.244
Dynamic capabilities			0.696	12.140***
R ²	0.029		0.497	
F	1.171		31.274***	

d. ***:P<0.01; **:P<0.05; *P<0.1)

4) The Mediation Effect Test of Dynamic Capability

Through the intermediary model test, it can be seen from model 7 that digital transformation has a significant indirect effect on dynamic capabilities, and digital transformation has a positive impact on dynamic capabilities; From model 8, we can see that the indirect effect of dynamic capability on enterprise performance is significant and positive, but the direct effect of digital transformation on enterprise performance is not significant; It can be seen from Model 9 that the total effect of digital transformation on enterprise performance is significant and positive. Therefore, digital transformation positively affects enterprise performance through the intermediary effect of dynamic capabilities, which is a complete intermediary effect (Table VIII). To sum up, the 4 hypotheses proposed in this study have been tested (Table IX).

TABLE VIII. THE MEDIATION EFFECT TEST OF DYNAMIC CAPABILITY

Variable	Dynamic Capabilities		Enterprise Performance		Enterprise Performance	
	Model 7		Model 8		Model 9	
	β	t	β	t	β	T
Enterprise size	-0.458	0.648	2.271	0.025	1.789	0.076
Enterprise age	0.149	0.882	0.470	0.639	0.486	0.628
Enterprise nature	0.846	0.399	0.465	0.643	0.815	0.417
Business type	-0.328	0.974	-1.608	0.111	-1.436	0.154
Digital transformation	0.852	17.264**	0.062	0.594	0.582	8.092***
Dynamic capabilities			0.756	7.694***		
R ²	0.648		0.479		0.288	
F	298.036		74.098		65.484	

e. ***:P<0.01; **:P<0.05; *P<0.1)

TABLE IX. A SUMMARY OF THE TEST RESULTS OF THE RESEARCH HYPOTHESIS

Research Hypothesis	Hypothesis Test
H1	establish
H2	establish
H3	establish
H4	establish

V. RESEARCH CONCLUSION AND ENLIGHTENMENT

A. Research conclusion

Based on the theory of dynamic capabilities, this paper constructs an intermediary model of "digital transformation - dynamic capabilities - enterprise performance", discusses the impact of digital transformation on the performance of logistics enterprises, and reveals the intermediary role of dynamic capabilities. The main conclusions are as follows: digital transformation has a positive impact on enterprise performance, and dynamic capabilities have an intermediary role in the relationship between digital transformation and enterprise performance. This intermediary path reveals the mechanism of digital transformation to improve enterprise performance. Specifically, digital transformation can help enterprises obtain competitor information, improve the ability of decision-making, insight into the market, and optimize the process, strengthen the ability of enterprises to perceive digital opportunities, enhance the ability of organizational restructuring, and broaden organizational boundaries, which is the resource base for the formation of dynamic capabilities. Using dynamic capabilities can help enterprises reduce costs and increase efficiency, improve financial and market performance, and improve overall performance of enterprises under complex and changing digital scenarios[7].

B. Practical enlightenment

1) Strategic choice of digital transformation of logistics enterprises

In combination with the development characteristics of logistics enterprises, a number of parallel transformation strategies are adopted. At present, most enterprises unilaterally understand digital transformation as technological transformation, and only through a large amount of capital investment in order to make further progress on the existing basis, which is not reasonable. Logistics enterprises should also pay attention to the transformation of operation mode and internal management of enterprises to achieve flat management and improve operation efficiency.

2) Improve enterprise dynamic capability through digital transformation

First, establish a customer behavior data analysis system to improve the data analysis ability. Secondly, in the face of the market environment that encourages competition, take the initiative to transform, change the concept of development, and comprehensively analyze the operation status of enterprises. Finally, change the operation mode and process, improve the management efficiency, increase the flexibility of the organization, promote the internal communication of the enterprise, make the management flexible and reduce the operation cost.

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