ISSN 2616-5902 Vol. 4, Issue 16: 41-45, DOI: 10.25236/AJBM.2022.041607

Digital Transformation, Regional Economic Development and High-quality Development of the Logistics Industry—— An Evidence from China

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Abstract: *Promoting high-quality development of the logistics industry is an important way to smooth domestic circulation in the new development pattern of "double circulation". Based on the data of China's A-share logistics listed companies from 2007 to 2021, this paper empirically studies how digital transformation can promote the high-quality development of the logistics industry. The results show that digital transformation promotes the high-quality development of the logistics industry by improving self-development and distribution mechanism; The level of regional economic development will significantly adjust the role of digital transformation in promoting the high-quality development of the logistics industry; Big data technology, cloud computing technology and digital technology application are the main digital transformation channels to promote the high-quality development of the logistics industry.*

Keywords: *Digital transformation, Logistics industry, High-quality development, Regional economic development*

1. Introduction

In the process of promoting high-quality economic development, the logistics industry plays an important and positive role as a basic, strategic and leading industry supporting the national economy. Therefore, promoting the high-quality development of the logistics industry is an inevitable choice to build a modern economic system and enhance the endogenous power of economic development. At present, the development of China's logistics industry is still insufficient in some regions. It is urgent to improve the ability of the logistics industry to serve the real economy and give play to its supporting and driving role in agriculture and manufacturing.

With the development of information and communication technology, various industries have begun to actively participate in the process of digital transformation, and use AI, big data and other technologies to help solve the core problems encountered in the process of enterprise development. For the logistics industry, digital transformation will help logistics enterprises gain new market competitiveness and improve the efficiency of resource allocation in the industry. Therefore, this paper focuses on the impact of digital transformation on listed companies in the logistics industry and further explores what digital transformation channels play a major role in this process. The research conclusions of this paper will help to understand how digital transformation can act as an endogenous power in the high-quality development of the logistics industry.

2. Theories and Hypotheses

The weakening of domestic demand caused by the epidemic of COVID-19 and the global economic recession, as well as the impact on the traditional transportation industry, have seriously hindered the development of the logistics industry. However, digital technology provides a new solution to this problem. Through digital transformation, the logistics industry can fully stimulate the vitality of operators, and accelerate intelligent development, the construction of a logistics network will also more effectively promote the connection of transportation modes and the formation of enterprise clusters, and the cross-border e-commerce network built by digital transformation can also bring new profit growth points for logistics enterprises[1], which will undoubtedly help logistics enterprises continue to promote the process of high-quality development in a complex external environment.

For logistics enterprises, the technological upgrading brought about by digital transformation is the

ISSN 2616-5902 Vol. 4, Issue 16: 41-45, DOI: 10.25236/AJBM.2022.041607

main mechanism to promote their high-quality development. Information technology can not only strengthen the connection between internal personnel of logistics enterprises but also strengthen the connection between logistics enterprises and customers and platforms. All kinds of problems encountered in the process of providing services are solved in time, it will help logistics enterprises reduce transaction costs and improve operating efficiency[2]. In addition, the research found that digital transformation has promoted an organizational change in logistics enterprises, strengthened the internal and external relations of enterprises, and can have a significant positive impact on the financial performance of logistics enterprises by reducing financing costs and improving management efficiency[3].

China's regional economy has always had obvious differences in development levels, showing a pattern of "strong in the east and weak in the west". The level of regional economic development determines the level of infrastructure construction. Therefore, there are still some practical problems in the logistics industry, such as a lack of policy support, weak logistics infrastructure construction, and a lack of coordinated development with other industries[4]. These problems may have an impact on the logistics industry to promote high-quality development through digital transformation. Therefore, this paper proposes the following hypothesis:

Hypothesis 1: Digital transformation can promote the high-quality development of the logistics industry;

Hypothesis 2: The level of regional economic development can significantly adjust the role of digital transformation in promoting high-quality development of the logistics industry.

The research framework of this paper is shown in Figure 1:

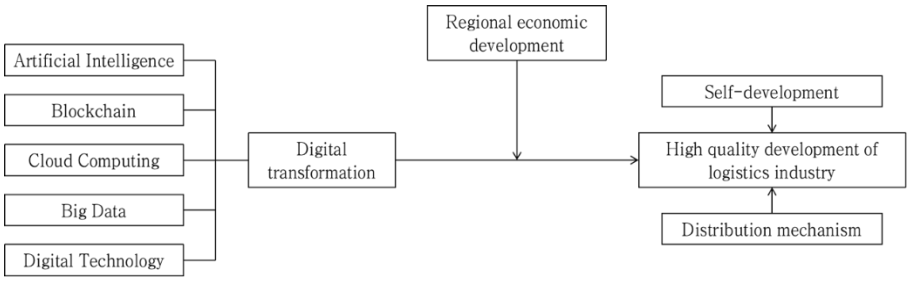

Figure 1: Research Framework

3. Empirical Results

This paper tested the hypotheses by building the following model:

$$Develop_{it} = \alpha_1 + \alpha_2 DT_{it} + \alpha_3 Control_{it} + \varepsilon_{it} \quad (1)$$

$$Develop_{it} = \alpha_1 + \alpha_2 DT_{it} + \alpha_3 RE_{it} + \alpha_4 DG_{it} \times RE_{it} + \alpha_5 Control_{it} + \varepsilon_{it} \quad (2)$$

$Develop_{it}$represents the high-quality development, DT_{it}represents the digital transformation degree, RE_{it}represents the level of regional economic development, $Control_{it}$represents all control variables, $\varepsilon_{it}$is a random error term.

The data in this paper comes from CSMAR, which contains the basic information, financial indicators, ownership structure and other detailed information of China's listed companies. The final panel data have 650 observations including 67 listed companies from 2007 to 2021.

Descriptive statistics and the VIF test of variables are shown in Table 1, there is no serious multicollinearity between variables.

The regression results are included in Table 2, it shows that the digital transformation degree of listed companies in the logistics industry can promote their development by improving their profit level and operating efficiency, and improve their distribution mechanism by improving their salary level and tax contribution. Therefore, digital transformation is helping to promote the high-quality development of listed companies in the logistics industry.

The test results of the moderating effect are included in Table 3, which shows that the level of regional economic development will significantly regulate the role of digital transformation in promoting high-quality development of the logistics industry. The higher the level of regional economic development, the stronger the promoting effect of digital transformation on the operating efficiency of listed companies

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in the logistics industry, while the lower the level of regional economic development, the stronger the promoting effect of digital transformation on the profit level, salary level and tax contribution of listed companies in the logistics industry.

Table 1: Descriptive Statistics and VIF Test

Variables	Observations	Mean	SE	Minimum	Median	Maximum	VIF
Profit	605	20.045	1.771	14.259	20.119	25.366	
Efficiency	650	0.577	0.648	0.034	0.345	4.289	
Salary	650	11.914	0.706	9.987	11.958	15.021	
Tax	650	11.066	1.146	8.245	11.025	18.752	
DT	650	-0.000	1.000	-0.412	-0.332	10.181	1.46
Size	650	8.433	1.623	2.890	8.500	12.085	1.43
Age	650	2.719	0.483	0.693	2.773	3.611	1.36
Profitability	645	0.073	0.198	-3.514	0.082	0.895	1.26
Lever	650	0.463	0.373	0.044	0.422	8.612	1.25
Ownership	650	0.863	0.344	0.000	1.000	1.000	1.73
Concentration	650	47.401	13.391	10.900	47.945	84.000	1.61
Dual	624	5.091	8.503	0.000	0.000	58.142	1.21
RE	588	10.198	0.932	5.833	10.320	11.615	1.25

Table 2: Regression Results

Variables	(1) Profit	(2) Efficiency	(3) Salary	(4) Tax
DT	0.206***	0.083**	0.093***	0.124***
	(0.047)	(0.036)	(0.026)	(0.045)
Size	0.542***	0.032***	-0.085***	-0.309***
	(0.049)	(0.012)	(0.030)	(0.047)
Age	-0.009	0.023	-0.039	-0.084
	(0.115)	(0.057)	(0.084)	(0.092)
Profitability	-0.901***	0.151	0.755***	0.384*
	(0.282)	(0.128)	(0.166)	(0.233)
Lever	9.812***	0.367***	0.113	0.728
	(1.256)	(0.134)	(0.113)	(0.512)
Ownership	1.218***	-0.687***	0.270***	0.441***
	(0.170)	(0.136)	(0.099)	(0.158)
Concentration	0.021***	-0.003	0.007***	0.015***
	(0.004)	(0.003)	(0.002)	(0.003)
Dual	0.003	-0.000	0.009***	0.008*
	(0.006)	(0.003)	(0.003)	(0.005)
_cons	12.903***	0.899***	11.777***	12.553***
	(0.572)	(0.306)	(0.412)	(0.483)
N	581	620	620	620
r2	0.580	0.213	0.077	0.194

*** p<0.01, ** p<0.05, * p<0.1

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Table 3: Moderating Effect Test

Variables	(1) Profit	(2) Efficiency	(3) Salary	(4) Tax
RE	0.640***	0.188***	0.634***	0.451***
	(0.115)	(0.048)	(0.058)	(0.111)
DT	0.321***	-0.003	0.143***	0.149***
	(0.058)	(0.044)	(0.030)	(0.057)
RE*DT	-0.713***	0.260**	-0.348***	-0.317*
	(0.175)	(0.119)	(0.077)	(0.172)
Size	0.525***	0.027**	-0.119***	-0.318***
	(0.046)	(0.012)	(0.028)	(0.047)
Age	-0.345***	-0.004	-0.358***	-0.267***
	(0.120)	(0.060)	(0.081)	(0.103)
Profitability	-0.750***	0.199	0.808***	0.440*
	(0.276)	(0.133)	(0.159)	(0.245)
Lever	10.605***	0.312**	0.025	0.548
	(1.461)	(0.122)	(0.096)	(0.457)
Ownership	1.411***	-0.695***	0.436***	0.506***
	(0.177)	(0.145)	(0.096)	(0.166)
Concentration	0.014***	-0.003	0.001	0.012***
	(0.004)	(0.003)	(0.002)	(0.004)
Dual	-0.004	-0.003	0.003	0.004
	(0.006)	(0.003)	(0.003)	(0.006)
_cons	14.059***	0.984***	13.099***	13.208***
	(0.581)	(0.333)	(0.407)	(0.547)
N	528	559	559	559
r2	0.645	0.255	0.330	0.244

*** p<0.01, ** p<0.05, * p<0.1

Table 4: Digital Transformation Channel Test

Variables	(1) Profit	(2) Efficiency	(3) Salary	(4) Tax
AI	-0.024	0.014	0.008	-0.052*
	(0.032)	(0.017)	(0.016)	(0.028)
BC	0.372	-0.208***	0.088	0.025
	(0.367)	(0.071)	(0.134)	(0.212)
CC	0.006	0.037**	-0.007	0.006
	(0.010)	(0.015)	(0.005)	(0.012)
BD	0.068**	-0.020	0.025*	0.069***
	(0.028)	(0.014)	(0.014)	(0.025)
DTA	0.018*	-0.006	0.009	0.017*
	(0.009)	(0.009)	(0.006)	(0.010)
Size	0.539***	0.040***	-0.089***	-0.311***
	(0.049)	(0.012)	(0.030)	(0.047)
Age	-0.036	0.038	-0.048	-0.124
	(0.118)	(0.058)	(0.085)	(0.094)
Profitability	-0.936***	0.207	0.731***	0.343
	(0.287)	(0.126)	(0.168)	(0.234)
Lever	9.829***	0.364***	0.112	0.716
	(1.240)	(0.133)	(0.113)	(0.515)
Ownership	1.277***	-0.745***	0.302***	0.526***
	(0.169)	(0.142)	(0.105)	(0.153)
Concentration	0.020***	-0.002	0.006***	0.014***
	(0.004)	(0.003)	(0.002)	(0.003)
Dual	0.004	-0.001	0.010***	0.010*
	(0.006)	(0.003)	(0.003)	(0.005)
_cons	12.893***	0.746**	11.785***	12.579***
	(0.570)	(0.302)	(0.411)	(0.484)
N	581	620	620	620
r2	0.582	0.245	0.080	0.202

*** p<0.01, ** p<0.05, * p<0.1

Furthermore, the channels of digital transformation are distinguished to test what kind of digital

ISSN 2616-5902 Vol. 4, Issue 16: 41-45, DOI: 10.25236/AJBM.2022.041607

technology plays a role in promoting the high-quality development of the logistics industry. The results of different channels are included in Table 4, it shows that the digital transformation channels that promote the high-quality development of listed companies in the logistics industry are mainly the application of cloud computing, big data and digital technology.

4. Conclusion

Firstly, the active participation of logistics enterprises in digital transformation can effectively promote the high-quality development of the logistics industry. The digital transformation has promoted the self-development of the listed companies of logistics enterprises by improving the profit level and operating efficiency, and also improved the distribution mechanism of the listed companies of logistics enterprises by improving the salary level and tax contribution.

Secondly, the level of regional economic development can adjust the role of digital transformation in promoting the high-quality development of the logistics industry. In regions with high regional economic development levels, digital transformation mainly improves the operating efficiency of listed companies in the logistics industry, while in regions with low regional economic development levels, digital transformation mainly improves the profit level of listed companies in the logistics industry and improves the distribution mechanism.

Finally, AI technology and blockchain technology have no significant impact on the high-quality development of the logistics industry, while cloud computing, big data and digital technology applications are the main channels to promote the high-quality development of the logistics industry.

In the process of digital transformation, listed companies in the logistics industry should actively use cloud computing, big data and digital technology applications, which will help to promote the high-quality development of the logistics industry and help the smooth internal circulation of China in the new development pattern of "double circulation".

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