

Analysis of The Impact of Digital Trade on The Management Efficiency of Chinese Silk Enterprises

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Abstract: In recent years, digital trade has gradually penetrated into the development of enterprises, and Chinese silk enterprises, as a link to promote world cultural exchanges, are also actively participating in digital transformation. As a multi-factor statistical analysis method, correlation analysis plays an important role in studying the strength of the relative relationship between indicators and other factors. Based on this, this paper takes the three listed companies of Chinese silk enterprises as representatives, and uses the gray correlation model to analyze the correlation between the digital trade evaluation indexes and the operational efficiency of Chinese silk enterprises, and proposes from the national level that the government should create a good business environment, accelerate the construction of cross-border e-commerce comprehensive pilot zones, and promote the fusion of the industry and the digital; and proposes from the enterprise level that it should fully mobilize the influencing factors that have a greater degree of correlation with the operational efficiency. In addition, it is proposed to fully mobilize the influencing factors that are more related to the operational efficiency from the enterprise level, seize the opportunity to flexibly respond to the opportunities and challenges brought by the economic changes, and provide support for the promotion of the economic efficiency of more silk enterprises in China.

Keywords: Grey correlation degree, Digital trade, Operating efficiency.

1 Introduction

According to the Digital Trade Development and Cooperation Report 2022, jointly released by the Department of Foreign Economic Research of the Development Research Center of the State Council and the China Academy of Information and Communications Technology, digital trade is becoming an important link in the opening and cooperation of the global digital economy, and is strongly promoting digital technological innovation, digital transformation of industries, international trade and the world economy, and is playing a role in the reorganization of global factor resources and the reshaping of international production networks, etc. increasingly prominent. Under the influence of the new crown epidemic and the uncertainty of the global economy, China has increased its investment in research and development, and continuously upgraded the construction of digital infrastructure, realizing the high-speed growth of cross-border digital trade; moreover, China has actively carried out global cooperation in digital trade, from "Silk Road E-commerce" to "intelligent cross-border logistics platform", making it possible for Chinese enterprises to have the opportunity to develop their own business. From

"Silk Road E-commerce" to "Intelligent Cross-border Logistics Platform", Chinese enterprises have more opportunities to participate in the development of global trade and the right to speak.

Silk is a kind of silk or synthetic fibers, man-made fibers, filaments and other woven textiles, as a unique Chinese characteristics of the product, to a certain extent, on behalf of the Chinese culture, is the link between China and the world, according to China Customs statistics, China's exports of silk goods in 2021 reached 1.349 billion U.S. dollars, compared to 2020 year-on-year growth of up to 25.95%. However, the development of China's silk enterprises is slow, lack of ways and means to internationalization, participation in digital trade is low, especially in recent years by the impact of the epidemic, operational efficiency needs to be improved.

At present, the evaluation indexes for the development level of digital trade have been elaborated in a more comprehensive and diverse way, Fei Lv, Axing Chen (2020)^[1] Keran believes that the development level of digital trade can be evaluated from four dimensions: trade potential, logistics environment, Internet environment and policy environment; Yanling Han, Qingqing Cai (2022)^[6] believes that five dimensions, namely, network infrastructure, technological level, trade mode, trade capacity and trade potential, can be used to evaluate the development level of a country's digital trade. can be used to evaluate the level of development of a country's digital trade; Shuzhong Ma, Jianqi Liu, Ge He (2022)^[8] put forward the evaluation indexes of the development potential of digital trade power from the micro, macro and meso perspectives, which mainly include five main dimensions, including trade potential, digital market, digital trade structure, digital trade status and digital trade environment. While more scholars have evaluated the business efficiency of enterprises from different dimensions, there are fewer studies on the evaluation indexes of business efficiency of apparel enterprises. Yinfei Chen and Mary Yang (2022)^[11] studied the relationship between digital transformation and enterprise operational efficiency, in which the evaluation of enterprise operational efficiency is mainly evaluated through the inventory turnover ratio; Hui He, Zhongyi Shi and Lijun Hong (2022)^[3] studied the relationship between foreign direct investment and enterprise operational efficiency, and concluded that when measuring the operational performance of listed companies, the accounting profit indicator, the net profit margin of total assets, is more stable and reliable, mainly through the ratio of net profit to total assets, which is more stable and reliable than total assets. In their study on the relationship between digitalization and operational efficiency of retail enterprises, Huang, Man-Yu and Wang, Hsiao-Hsing (2022)^[9] used the LP method to estimate the selection of operational efficiency indicators of enterprises, in which the input indicators include the number of people employed by the enterprise, the input of fixed assets, and the cost of purchasing goods and services, and the output indicators are mainly based on the main business revenues of the enterprises in the selected area. The output indicators are mainly the main business income of the selected area.

Through the combing of the literature can be found, the existing research still exists in the following shortcomings First, at present, there are still fewer by the literature from the perspective of digital trade to explore the relationship between a country's level of development of digital trade and the operational efficiency of the enterprise; Second, most of the literature is based on the traditional listed companies or retail enterprises, there is no research on the operational efficiency of the apparel enterprises; Third, China's textile and apparel enterprises cover a wide range of fields, a variety of types, and with the cross-border e-commerce platforms, the business efficiency of the enterprises has been reduced. Third, China's textile and garment

enterprises cover a wide range of fields and are diverse, and with the development of cross-border e-commerce platforms, the research on their segmentation is of great significance.

Based on this, this paper takes silk enterprises as an example, uses the correlation analysis method to study the degree of correlation between digital trade development evaluation indexes and the operational efficiency of Chinese silk enterprises, and puts forward suggestions to improve operational efficiency, which is of theoretical significance and practical significance.

2 The Construction of Business Efficiency Indicator System for Chinese Silk Enterprises

2.1 Case Selection

This paper follows the principle of typicality, the use of case study method to select a representative silk listed companies to analyze, in order to improve the representativeness and effectiveness of the theoretical construction of the case selection is mainly for the following reasons: first of all: Jiaxin Silk, Wansili, Golden Eagle shares are the domestic leading enterprises in the silk category; secondly, the two companies are in the layout of the digitalization, and due to the three companies are listed companies, the data to obtain a more accurate. Therefore, this paper chooses Jiaxin Silk, Wansili and Golden Eagle as typical cases.

2.2 Operational Efficiency Indicator System

In this paper, Chen Yinfei and Mary Yang's^[12], Hui He^[3]etc evaluation index of enterprise operating efficiency, in which enterprise operating efficiency is represented by inventory turnover ratio, affected by the availability of data, Chinese silk enterprises listed late, so the inventory turnover ratio data of Jiaxin Silk, Wansili, and Golden Eagle shares, three Chinese silk listed enterprises in the period of 2018-2021, are selected, refer to Table 1 for raw data.

Table 1 Operating efficiency of listed companies of Chinese silk enterprises.

Year	Jiaxin Silk				Wansili				Golden Eagle shares			
	2018	2019	2020	2021	2018	2019	2020	2021	2018	2019	2020	2021
Annual operating efficiency Y (%)	7.03	7.91	5.25	5.16	3.2	3.2	3.4	2.6	1.6	1.6	1.4	1.9

3 Empirical Analysis

3.1 Assessment Model

This paper selects the gray correlation model, which is a gray correlation analysis method proposed by Deng Julong based on small sample data, which does not require the data to meet the typical distribution law, and through the gray correlation between the indicator sequence of the evaluated object and the reference sequence, it is a further quantitative and comparative analysis method of the relationship between the dynamic indicator data of the time series and the computational amount is small. It mainly consists of five steps: establishing the parent series,

dimensionless processing, calculating the gray correlation coefficient, calculating the mean value of the correlation coefficient, and forming the correlation sequence, of which the formula for calculating the gray correlation coefficient is as follows.^[10]

$$\zeta_i(k) = \frac{\min_k |x_0(k) - x_i(k)| + \rho \max_k |x_0(k) - x_i(k)|}{|x_0(k) - x_i(k)| + \rho \max_k |x_0(k) - x_i(k)|} \quad (1)$$

3.2 Digital Trade Development Indicators System

The indicators in this paper draw on the evaluation indicators for the level of digital trade development published by Fei Lv, Axing Chen, Conghui Zhao^[2], the World Bank and the World Economic Forum, etc^[4-5,7]. The main indicators include four level 1 indicators of trade potential, logistics environment, internet environment, policy environment, technological innovation and 15 level 2 indicators. Data sources: annual reports of enterprises, Chinese government website, CEIC data, National Bureau of Statistics, China Cross-border E-commerce Policy Research Report, China Cross-border E-commerce Innovation and Development Report, China Patent Statistical Annual Report 2017, WIPO and others, refer to Table 2 for specific indicators.

Table 2 Digital trade development indicator system.

	Definition	Variable	Variable Formula
Dependent Variable	Operating Efficiency	Y	Inventory Turnover = Firm's cost of doing business (cost of goods sold)/average inventory balance for a given period of time
Independent variable	Trade potential	X1	GDP/billion yuan
		X2	GDP per capita/million yuan
		X3	Total annual retail sales of consumer goods/billion yuan
		X4	Disposable income per capita/yuan
		X5	Total imports and exports/billion yuan
	Logistics environment	X6	Express volume/billion pieces
		X7	Express income / billion yuan
		X8	highway mileage / million kilometers
		X9	Internet population / billion
		X10	Internet penetration rate / %
		X11	Mobile phone penetration rate / part / 100 people
	Policy environment	X12	Number of comprehensive cross-border e-commerce pilot zones
		X13	Number of cross-border trade e-commerce service pilots
	Digital Innovation	X14	Share of R&D investment in GDP /%
		X15	Number of Patent Applications

3.3 Relevance analysis

Obtaining China's raw data under the five indicators of trade potential, logistics environment, internet environment, policy environment, and digital innovation through the National Bureau of Statistics, China Cross-border E-commerce Policy Research Report, China Cross-border E-commerce Innovation and Development Report, China Patent Statistics Annual Report 2017, WIPO and others.

The mean values of the gray correlation coefficients of the operational efficiency of the three silk enterprises with the five indicators of trade potential, logistics environment, Internet environment, policy environment and digital innovation were obtained after the dimensionless process, as shown in Table 3, Y1, Y2, and Y3 represent the correlation coefficients of the three case companies; X represents the digital trade development index.

Table 3 Correlation coefficient table.

	Y1	Y2	Y3
X1	0.67	0.79	0.89
X2	0.68	0.79	0.89
X3	0.71	0.81	0.88
X4	0.67	0.79	0.87
X5	0.54	0.76	0.90
X6	0.54	0.68	0.68
X7	0.54	0.58	0.60
X8	0.79	0.96	0.77
X9	0.65	0.80	0.84
X10	0.65	0.80	0.83
X11	0.73	0.85	0.88
X12	0.45	0.55	0.55
X13	0.40	0.47	0.47
X14	0.70	0.84	0.86
X15	0.58	0.55	0.66

The data visualization shows the correlation of 15 digital trade development indicators on the operational efficiency of Chinese silk enterprises Jiaxin Silk, Masterpiece and Golden Eagle respectively. From the Figure 1, it can be seen that the top five influencing factors of the development of digital trade on Jiaxin Silk are highway mileage, cell phone penetration rate, annual retail sales of consumer goods, R&D investment in terms of the share of GDP and GDP per capita. The top five influencing factors are highway mileage, cell phone penetration rate, annual total retail sales of consumer goods, number of Internet users, and GDP; and the top five influencing factors for Golden Eagle are highway mileage, cell phone penetration rate, R&D investment as a share of GDP, annual total retail sales of consumer goods, and GDP.

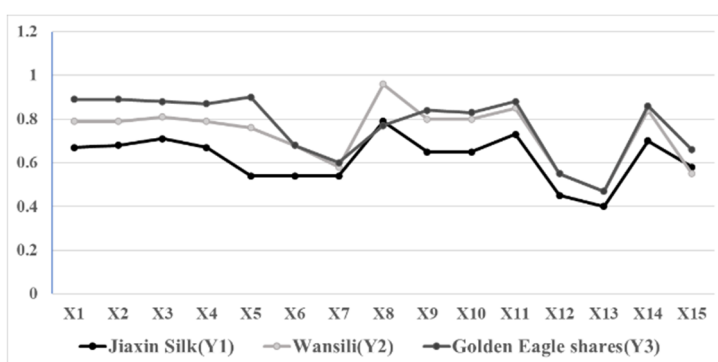


Figure 1 Line chart of correlation degree of each influencing factor.

Taken together, it shows that the various indicators of digital trade development have a greater correlation between the number of highway mileage, total annual retail sales of consumer goods, cell phone penetration rate, GDP and the proportion of R&D investment in GDP and the operational efficiency of Chinese silk enterprises; while the cross-border e-commerce integrated pilot zone and cross-border trade e-commerce service pilot sites as well as courier revenues and express delivery volume have a smaller correlation with the operational efficiency of China's silk enterprises. It shows that at present the operating efficiency of China's silk enterprises is still mainly focused on the domestic development, and by the domestic economic situation, e-commerce development situation has a greater impact, especially in recent years, with the sustained development of China's economy, in the context of the epidemic, China's digitization process has accelerated, whether it is R & D and manufacturing or the popularity of the Internet cell phone has been significantly increased for the impact of the enterprise has also been further increased; However, due to the development of cross-border trade is still weak, as can be seen from the figure, China's cross-border e-commerce is still in the initial stage of development, for the penetration of the clothing and silk industry is still far from enough, hindering China's silk enterprises to improve operational efficiency, slowing down the process of moving towards internationalization, to be further with the enhancement.

4 Conclusions

This paper used the gray correlation analysis method to construct for the first time the link between the level of digital trade development and the operational efficiency of Chinese silk enterprises, and found that the operational efficiency of Chinese silk enterprises is more correlated with the mileage of highways, the penetration rate of mobile telephones, and the annual total retail sales of social consumer goods, and less correlated with the cross-border e-commerce comprehensive pilot area and the cross-border trade and e-commerce service pilot sites.

5 Recommendations

Therefore, this paper has the following two main suggestions:

National level: the government should increase macro-level policy support, create a good business environment, accelerate the construction of comprehensive cross-border e-commerce pilot zones, promote the integration of industry and digital, and promote the optimization and upgrading of foreign trade, making cross-border trade further development there; at the same time, improve the implementation of specific programs on the ground to strengthen the supervision and effective guidance of the digital trade penetration of enterprises in various industries, and to promote the synergistic development of various industries.

Enterprise level: the current participation of China's silk enterprises in the development of digital trade is still relatively low, their own management mode and operation also exists to impede a greater degree of participation in the development of digital influencing factors, so enterprises should be fully mobilized with a greater degree of correlation with the operational efficiency of the influencing factors, seize the opportunity to flexibly respond to the economic changes brought about by the opportunities and challenges, and do a good job of the

transformation of the business mode of online and offline, improve their own R&D level, and improve enterprise operation.

This paper also has the following three problems: first, because the theoretical system of gray correlation is not very perfect, so its application is subject to certain limitations; second, there are only three listed companies for Chinese silk enterprises, so the representativeness of the selected enterprises in this paper is subject to further discussion; third, there are multiple perspectives for the evaluation of the operational efficiency of Chinese silk enterprises and the level of development of digital trade, and in the future, we can increase the number of indicators to improve the accuracy of the study. Third, there are several angles for evaluating the business efficiency of Chinese silk enterprises and the development level of digital trade, in the future, we can increase the indexes to improve the accuracy of the study.

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