

# Research on the Mediation Model and Empirical Analysis for the Influence of Digital Investment on Retail Business Performance

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**Abstract:** The purpose of this paper is to systematically analyze the influence of digital input on the business process and business performance of retail businesses, and to establish a model for empirical verification with quantitative methods. Based on the data of A-share retail listed companies from 2010 to 2020, this paper establishes a mediation model and verifies the impact and mechanism of digital investment on the performance of retail businesses. The empirical results show that the digital investment of businesses can positively affect the performance of businesses. From the perspective of influencing mechanism, digital investment affects business performance through three paths: digital operation and management, digital innovation of retail, and business innovation outside retail. In the conclusion, how to understand the role of digital technology in retail operation, how to use the intermediary model to guide businesses to make targeted investment, and how to strengthen the determination of businesses to digital investment and transformation are further explained.

**Keywords:** Digital Transformation, Digital Investment, Mediation Model, Empirical Analysis, Business Performance.

## 1 INTRODUCTION

Looking back at the previous research on digital transformation of retail industry, scholars mostly qualitatively study the mechanism and connotation of digital transformation through cases [4, 13]. The digital transformation of the retail industry is essentially the reconstruction of people, goods and market elements [9], with consumer demand as the core and digital technology as the driving force, reengineering business processes.

However, there is little quantitative research on the performance of retail businesses by digitalization at present. Dong (2022) based on the data of 76 listed retail businesses and the perspective of channel concentration, verified that the digital transformation of retail businesses is conducive to improving their operational performance and enhancing their profitability and capital planning ability; Huang (2022) found that digital transformation has a positive impact on business efficiency by expanding the market scale and improving management efficiency, and the excessive scale will inhibit the promotion of retail businesses' digital transformation on business efficiency. Similar to "IT productivity paradox", some scholars found that the business

efficiency of dual-channel retail businesses after O2O transformation did not significantly improve<sup>[15]</sup>.

Does digital investment increase the cost of the business and thus reduce its performance? Or through other ways to improve corporate performance? Therefore, clarifying the impact of digital investment on the performance of retail businesses in the process of digital transformation, as well as the mechanism and path behind it, and making a reasonable investment plan according to the characteristics of the retail industry will help businesses solve the problems of "dare not turn" and "won't turn", and help them formulate a reasonable digital strategy.

## **2 THEORETICAL ANALYSIS AND RESEARCH HYPOTHESIS**

### **2.1 The Influence of Digital Investment on the Retailing Performance**

The process of digital transformation of businesses is the reconstruction of business, process and organization by digital technology<sup>[12]</sup>, and its ultimate goal is to improve the competitiveness and profitability of businesses. First of all, digital transformation is a process of applying digital technology to organizational change<sup>[3]</sup>. Digital technology has broken through the digital barrier between business departments and even between businesses, and through the establishment of collaborative system and resource integration, the organizational structure of businesses is more agile and flexible, thus improving the internal operational efficiency and organizational performance of businesses. Secondly, digital technology has significantly improved the information processing capability of businesses<sup>[11]</sup>.

In the process of digital transformation, retail businesses will generate a large amount of transaction data. The application of big data, cloud computing and other technologies makes these previously unknown data "live" and become a brand-new production factor of businesses, and tap its value to help improve the efficiency of decision-making, production, circulation, marketing and other processes of businesses. In the digital era of changing consumer demand, fiercer competition among businesses, shorter product cycle, and full of complexity and uncertainty in the market, digital technology can help businesses accurately grasp the demand and gain insight into the market trend, so as to revise and formulate appropriate strategies in time.

According to Accenture's Digital Transformation Index of China Businesses, from 2015 to 2017, the compound growth rate of digital transformation leader's operating income was as high as 14.3%, while that of other businesses was only 2.6%. In 2017, the former's sales profit margin reached 12.7%, while the latter was only 5.2%.

So, the hypothesis is proposed in this paper:

**H1:** Digital investment has a positive impact on the performance of retail businesses.

### **2.2 Mediating Mechanism by Which Digital Investment Affects Retailing Performance**

The essence of the process of digital transformation is the digital transformation of management mode<sup>[7]</sup>. Digital management is a management method that utilizes digital technology to

quantify management objects and behaviors and realize functions such as planning, organization, production, sales, service, innovation, etc., and introduces digital technology into business operation and management to promote the systematic reshaping of business organizational structure, information flow, management methods and operation mechanism. The development and popularization of digitalization has enhanced the insight of businesses into all aspects of operation and management, which can better make operation and management decisions and improve operation efficiency.

The improvement of digital technology on the operation and management efficiency of retail businesses is mainly reflected in the following two aspects. On the one hand, the digital transformation makes the organizational structure tend to be networked and flat <sup>[10]</sup>. The application of digital technology speeds up the circulation of information elements in businesses, and managers can quickly perceive the changes in the business and the market and take prompt measures to deal with them. In addition, digital technology connects the "digital islands" of different departments of the business, strengthens data sharing among different departments, promotes communication and learning within the organization, stimulates the innovation of employees' production management, and empowers total factor production. For example, through big data analysis and mining of employees' career information, businesses build a big data platform for human resources, which brings employee recruitment and talent training into the quantitative category and provides reliable basis for management decisions such as performance assessment, employee motivation and employee promotion.

On the other hand, digitalization and related technologies have played an important role in the innovation of supply chain management of businesses <sup>[1]</sup>. For example, block chain technology is essentially a distributed and immutable database. As a distributed ledger technology to ensure transparency, traceability and security, it can play a huge role in product traceability and strengthening trust between businesses. Big data analysis and cloud computing technology solve supply management, demand forecasting, inventory control and transportation route design in operation by analyzing a large amount of supply chain operation data. By incorporating digital technologies, it reduces out-of-stock rates, reduces purchase lead times, reduces inventory levels throughout the supply chain and increases corporate profits.

Therefore, the hypothesis is put forward in this paper:

**H2:** Digital investment positively affects the performance of retail businesses by improving the efficiency of digital operation and management.

In the process of digital transformation, digital technology promotes the digital innovation and development of retail business model. Under the background of digital economy, traditional retail businesses are faced with more and more personalized consumer demand, the impact of e-commerce businesses and many other pressures. The traditional business model is difficult to guarantee the profit source of businesses, and the value growth has shifted to online and offline service activities.

Therefore, businesses use digital technology to optimize the entire industrial value chain, integrate and continuously improve users' online and offline shopping and service experiences, and maintain and enhance their competitive advantages. The digital innovation of retail is a new retail model that takes consumers as the core, digital technology as the driving force, realizes online and offline integration through intelligent infrastructure, reconstructs retail scenes, and

realizes full scene, full customer base, full data, full experience, and omni-channel integration. New retail formats generated by digital innovation of businesses emerge in endlessly: Super Species, Box Horse Fresh Life, Bailian RISO, Tianhong SP@CE, Easy Carrefour and other new retail formats appear and develop rapidly.

Compared with traditional retailing, the new retailing pays more attention to scene marketing and customer experience, and relies on the Internet and big data to deeply integrate online and offline, so as to realize the sharing of data information such as products, members, transactions and marketing, and provide consumers with the ultimate experience of cross-channel and seamless. For example, retail plus Internet of Things technology collects customers' movement track, attention change and customer flow information by using various sensors placed in the store for store operation and precision marketing; With retail and virtual reality technology, the visual display of goods will be upgraded from two-dimensional to three-dimensional. AR will be used to help customers experience the 3D layout effect of goods before purchase, and VR will be used to help customers test the product effect. Digital twin combined with AR/VR technology will make the interactive experience in the real sense become reality.

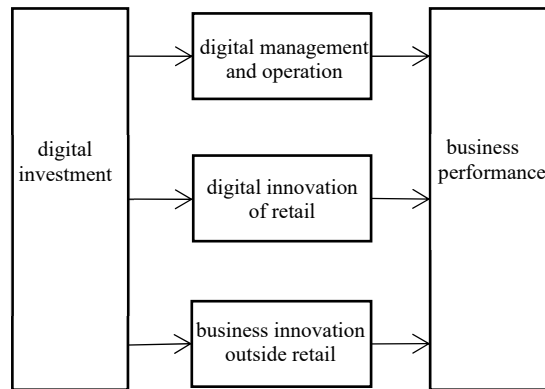
Therefore, the hypothesis is put forward:

**H3:** Digital investment positively affects the performance of retail businesses through digital innovation of retail.

At the same time, the digital transformation of businesses gives them more value-added opportunities in the value chain. For example, Yonghui Supermarket uses the massive consumer data accumulated in the process of business digitalization, analyzes the consumer behavior characteristics behind the data to judge its credit, and issues consumer loans to form a "cloud gold" financial business. Huadu businesses use consumer data to develop digital marketing services, e-commerce operation services and customized product marketing services. Hongqi Chain uses big data to develop IMP integrated marketing platform, and successfully builds a new model of community retail. Generally speaking, the more digital technology businesses invest, the better new models and new businesses will be developed, and the better business performance will be. Therefore, the hypothesis is put forward:

**H4:** Digital investment positively affects the performance of retail businesses through business innovation outside retail.

To sum up, digital transformation affects the performance of retail businesses by digital operation and management, digital innovation of retail, and business innovation outside retailing. And the theoretical model of this paper is established, as shown in Figure 1.



**Figure 1:** Research framework diagram

### 3 SAMPLE, VARIABLES, AND MODELING

#### 3.1 Sample Selection

In 2010, with the rise of mobile Internet, new formats are constantly emerging, and netizens have an unprecedented impact on the social economy. The digital economy has entered a new stage, and the physical retail businesses in China have started the practice of digital transformation. Considering the listing time of domestic retail businesses and the impact of Covid-19 epidemic, the research time interval is locked in 2010-2020. Secondly, the retail industry includes many sub-industries. In order to ensure the comparability of digital transformation, business model and profit model, 30 major supermarkets listed on A-share market are selected as the research objects. The data of the research comes from the national CSMAR database and the annual reports of listed companies.

#### 3.2 Variable Definition

- Explanatory variables: Digital investment.

According to the characteristics of retail businesses, this paper takes the digital investment of software, sales network, ERP and other digital technologies in the intangible assets of businesses as the digital investment of businesses, and measures the digital investment level by the ratio of digital investment to operating income.

- Mediator variable: Digital operation and management.

In this paper, the related word frequency of text mining, business management fee rate and inventory turnover rate are used to measure the digital operation and management of businesses. The higher the frequency, the higher the application of digital technology. The lower the management fee rate of an business, the higher the inventory turnover rate, indicating the higher the operation and management efficiency of the business. Therefore, the related word frequency \* inventory turnover rate/management fee rate is used to measure the digital operation and management of businesses.

First, build a digital technology "thesaurus" shown in table 1. Use jieba package in python software to segment the listed annual reports of selected companies, and learn from the research of scholars such as Wu (2021) and Zhao (2021) to form digital technology "thesaurus".

Secondly, use python to count the frequency of keywords in the "thesaurus" in the annual report.

Finally, the result is calculated by the formula  $M = \frac{m_{it} \times \text{inventory}_{it}}{\text{cost}_{it}}$  (word frequency, inventory turnover rate and management fee rate have been normalized in order to unify the dimensions).  $m_{it}$  represents the number of digital technology keywords of  $i$  business in  $t$  year,  $\text{inventory}_{it}$  represents the inventory turnover rate of  $i$  business in  $t$  year, and  $\text{cost}_{it}$  represents management fee rate of  $i$  business in  $t$  year. The larger the  $M$ , the higher the degree of digital operation and management.

- Mediator variable: Digital innovation of retail.

Under the background of digital transformation, retail digital innovation has become an important development strategy of businesses, and such important information will be elaborated in the annual report. Therefore, it is scientific and feasible to use text mining technology to count the keyword word frequency (normalized word frequency) about retail digital innovation in annual reports of businesses to measure the degree of retail digital innovation.

- Mediator variable: Business innovation outside retailing.

This paper adopts the growth rate of other business income as an index to measure the innovation outside retail business. Other business income of retail businesses includes financial services, digital operation services, advertising services, etc. The greater the growth rate of other business income, the better the innovation of businesses' off-retail business.

- Explained variable: business performance.

In this paper, referring to the research of Yi, Wu and other scholars (2021), the return on assets excluding financial income is used to measure business performance.

Specifically,  $R = (\text{operating profit} - \text{investment income} - \text{fair value change income} + \text{investment income for joint ventures and joint ventures}) / \text{total assets}$ .

- Control variables.

Using previous scholars' relevant research for reference, the variables that may affect the innovation performance of businesses are selected as control variables.

The variables and their symbols are shown in Table 2.

**Table1:** Digital technology keywords.

	keywords
Digital technologies related to digital operation management	Big data, database, data center, artificial intelligence, cloud computing, machine learning, data mining, deep learning, smart contract, cloud platform, big data platform, Internet of Things, 5G, RFID, blockchain, commodity traceability

Digital technologies related to digital innovation of retailing	Instant consumption, unmanned technology, virtual reality, omni-channel, live broadcast, mini program, online and offline, Retail format, experiential retail, scene retail, network collaboration, retail ecology
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**Table2:** Variables' name and symbol.

	The variable	Variable symbol
Explanatory variables	Digitization input	D
Mediator variables	Digital operations and management	M
	Digital innovation of retail	N
	Business innovation outside retail	B
The variable being explained	Business performance	R
Control variables	Company age	age
	Cash ratio	cash
	Gearing ratio	liability
	Total asset	scale
	Year fixed effect	year

### 3.3 Model Setting

Based on Wen (2004) practice, this paper adopts the three-step method to construct the mediator effect test model. Firstly, it examines the direct impact of digital investment on retail businesses.

$$R_{i,t} = \omega_0 + \omega_1 D_{i,t} + \sum \omega_k \text{Control}_{i,t} + \varepsilon_{i,t} \quad (1)$$

Among them,  $\omega_0$  is a constant term, subscript  $i$  and  $t$  represent business and year respectively,  $\text{Control}_{i,t}$  represent control variables, and  $\varepsilon_{i,t}$  are random error terms.

Secondly, test the influence of digital input on mediator variables.

$$M_{i,t} = \alpha_0 + \alpha_1 D_{i,t} + \sum \alpha_k \text{Control}_{i,t} + \varepsilon_{i,t} \quad (2)$$

$$N_{i,t} = \beta_0 + \beta_1 D_{i,t} + \sum \beta_k \text{Control}_{i,t} + \varepsilon_{i,t} \quad (3)$$

$$B_{i,t} = \theta_0 + \theta_1 D_{i,t} + \sum \theta_k \text{Control}_{i,t} + \varepsilon_{i,t} \quad (4)$$

Finally, the mediator effect is tested. According to the previous hypothesis, digital investment can improve the performance of businesses by influencing mediator variables, so formula (2), (3) and (4) can be brought into formula (1).

$$R_{i,t} = \gamma_0 + \gamma_1 D_{i,t} + \gamma_2 M_{i,t} + \gamma_3 N_{i,t} + \gamma_4 B_{i,t} + \sum \gamma_k \text{Control}_{i,t} + \varepsilon_{i,t} \quad (5)$$

## 4 EMPIRICAL RESULTS AND ANALYSIS

### 4.1 Descriptive Statistics

Table 3 is the descriptive statistical results of all variables in this paper. From the perspective of digital input level, the min is 0, the max is 0.095, and the SD is 0.025, which shows that the sample businesses have a big gap in digital investment. And the average value of 0.022 is greater than the median value of 0.012, and the data distribution is to the right, which shows that only a few businesses have a relatively high proportion of digital investment, and most businesses have insufficient digital investment.

**Table3:** Descriptive statistics of research sample.

Variable	N	Min	Max	AVG	SD	Median
Digitization input	287	0.000	0.095	0.022	0.025	0.012
Digital operations management	286	0.000	4.184	0.364	0.540	0.186
Digital innovation of retail	287	0	1	0.027	0.064	0.013
Business innovation outside retail	276	-0.970	4.679	0.131	0.464	0.105
Business performance	287	-0.243	0.187	0.033	0.039	0.036
Company age	287	3.000	39.000	19.404	6.738	20.000
Cash ratio	287	0.026	2.546	0.527	0.465	0.376
Gearing ratio	287	0.146	0.943	0.578	0.157	0.589
Total assets	287	1.089	56.158	9.018	7.265	7.230

Note: Total asset unit: billion yuan

Similarly, it indicates that the sample businesses have great differences in performance and business innovation outside retail. In terms of digital operation management, similar to digital investment, the digital operation management level of a few businesses is higher, but the overall level is lower. In the aspect of digital innovation of retail, the innovation level of different companies fluctuates greatly between different years. In addition, there are significant differences in the control variables, and controlling them is effective for the study of firm performance.

### 4.2 Regression Analysis of the Influence of Digital Investment on Business Performance

Table 4 shows the basic regression results of the impact of digital investment on the performance of retail businesses. Column (1) shows that the regression is carried out by the ordinary least squares method (OLS) without adding control variables, and the regression coefficient value of digital investment is 0.345, but the result is not significant. Column (2) is the regression result with the addition of control variables, and the digital investment coefficient is significantly positive at the level of 0.01, which means that digital investment will have a significant positive impact on the performance of retail businesses, and R2 has been significantly improved, indicating that the degree of regression interpretation is further enhanced. In column (3), the



year fixing effect is added, and the results show that the significance and  $R^2$  are obviously improved. To sum up, digital investment has a positive impact on the performance of retail businesses, and it is necessary and effective to add control variables and year fixed effect, so H1 has been verified.

**Table 4:** Results of benchmark regression analysis of digital investment on the business performance.

	(1)	(2)	(3)
Constant	0.025* (0.003)	0.052** (0.015)	0.054** (0.013)
Digitization investment	0.345 (0.093)	0.382** (0.084)	0.410** (0.731)
Company age		0.001 (0.001)	0.002* (0.002)
Cash ratio		0.016* (0.007)	0.004* (0.006)
Gearing ratio		-0.076** (0.019)	-0.133** (0.018)
Total assets		0.000 (0.000)	0.001* (0.000)
year	Uncontrol	Uncontrol	Control
N	287	287	287
$R^2$	0.046	0.246	0.469

Note: \*  $p < 0.05$  \*\*  $p < 0.01$  Standard error in parentheses

### 4.3 Analysis of Mediating Mechanism

Table 5 shows the mediator role of digital operation and management, digital retail innovation and business innovation outside retail in the impact of digital investment on the performance of retail businesses. Column (1) shows the direct impact of digital investment on the performance of retail businesses, and digital investment has a significant role in promoting the performance of retail businesses. Columns (2) and (5) are the test results of the mediator role of digital operation and management. In column (2), the coefficient of digital investment is significantly positive at the level of 0.05, indicating that digital investment has a positive role in promoting the digital operation and management of retail businesses. Column (5) shows that digital operation and management can significantly improve the performance of retail businesses. Combined with the data in columns (2) and (5), it shows that digital operation and management has played a partial mediator role, and retail businesses have improved their digital operation and management level through digital investment, thus improving their performance. Generally, businesses with large digital investment will pay more and more attention to digital management of businesses, and apply the invested digital technology to the reform and upgrading of business management and supply chain management. H2 has been verified.

**Table5:** Results of mediator effect test.

	Business performance	Digital operations management	Digital innovation of retail	Business innovation outside retail	Business performance
	(1)	(2)	(3)	(4)	(5)
Constant	0.052** (0.013)	0.232 (0.239)	0.043 (0.027)	0.705* (0.277)	0.043** (0.013)
Digitization investment	0.399** (0.075)	3.155* (1.354)	0.314* (0.157)	6.084* (1.568)	0.318* (0.077)
Digital operations management					0.007* (0.003)
Digital innovation of retail					0.074* (0.029)
Business innovation outside retail					0.006* (0.003)
Year fixed effect	control	control	control	control	control
Other control variables	control	control	control	control	control
N	275	275	275	275	275
R 2	0.468	0.094	0.147	0.088	0.497

Note: \* p<0.05 \*\* p<0.01 Standard error in parentheses

Columns (3) and (5) are the test results of the mediator role of digital innovation of retail. The results of column (3) show that digital investment can significantly improve the digital innovation of retail businesses; Column (5) shows the positive impact of retail digital innovation on business performance, and it is significant at the level of 0.05. It can be seen from columns (3) and (5) that retail digital innovation plays a partial mediator role between business digital investment and business performance, which is similar to the conclusion of Qi (2020) who studied the digital transformation of manufacturing industry, and H3 has been verified.

Columns (4) and (5) are the test results of the mediator role of business innovation outside retail. Among them, column (4) indicates that the digital investment of retail businesses can significantly improve the business innovation outside retail, which is also consistent with the conclusion of Qian (2021); In column (5), the coefficient of business innovation outside retail is positive at the level of 0.05. According to columns (4) and (5), it can be seen that the business innovation outside retail has played a partial mediator role, that is, the digital investment of retail businesses has improved the business innovation outside retail and thus improved the performance of businesses, so H4 has been verified.

## 5 ROBUSTNESS TEST

In the research of management science, the sample itself is highly heterogeneous, and many variables can't be observed and measured accurately, which is often plagued by endogenous problems. In this paper, there is also an endogenous influence between digital investment and business performance. On the one hand, the degree of digital investment will promote the

performance of businesses; on the other hand, the performance of good businesses will also increase the degree of digital investment. In order to solve the endogenous problem, using the practices of scholars in Wang (2017) for reference, and using lagging explanatory variables for regression, this paper adopts a lagging digital investment.

**Table6:** Robustness test.

	Business performance	Earnings per share	ROE
	(1)	(2)	(3)
Digitization investment		3.614*	0.809**
		(1.747)	(0.245)
Lag one phase of digital investment	0.185* (0.082)		
Constant	0.059** (0.014)	-0.537 (0.311)	0.047 (0.044)
Company age	0.002** (0.001)	0.032** (0.007)	0.004** (0.001)
Cash ratio	0.006 (0.006)	0.154 (0.139)	-0.001 (0.019)
Gearing ratio	-0.143** (0.019)	-0.095 (0.428)	-0.182* (0.060)
Total assets	0.002** (0.001)	0.043 (0.006)	0.004** (0.001)
Year fixed effect	control	control	control
N	247	287	287
R 2	0.453	0.236	0.301

Note: \* p<0.05 \*\* p<0.01 Standard error in parentheses

Results As shown in Table 6 (1), the regression coefficient is still significant at the level of 0.05, indicating that the significant positive impact of digital investment on business performance still exists after controlling endogenous problems. In addition, in order to ensure the robustness of the model, this paper also adopts new variables to replace the performance level of businesses, which are measured by earnings per share and ROE. The empirical results are shown in columns (2) and (3) in Table 6. The digital investment of businesses has significantly improved the level of EPS and ROE of businesses (the regression coefficients are 3.614 and 0.809 respectively, which are significant at the level of 0.05 and 0.01 respectively). Therefore, the conclusion that digital investment has a positive impact on the performance of retail businesses is robust.

## 6 CONCLUSION

Based on the data of A-share listed retail businesses from 2010 to 2020, this paper empirically verifies the mechanism of the impact of digital investment on the performance of retail businesses under the background of digital transformation. This paper innovatively measures the digital operation and management of retail businesses. According to the fact that the digital transformation of retail businesses is the transformation of circulation and supply system driven by digital technology with consumer demand as the core, three paths of digital investment's

impact on retail businesses' performance are summarized, and the following conclusions are obtained: First, digital investment has a significant positive impact on retail businesses' performance, and the conclusion is still valid even after one period lag. Secondly, the digital investment has effectively improved the digital operation and management, digital innovation of retail and business innovation outside retail of retail businesses. Thirdly, digital operation and management, digital innovation of retail and business innovation outside retail have significant mediator effects between digital investment and retail business performance, revealing the ways of digital investment's influence on retail business: digital investment→digital operation and management →business performance improvement, digital investment→digital innovation of retail→ business performance improvement, digital investment →business innovation outside retail→business performance improvement.

Based on the analysis of the above conclusions, the following implications are obtained:

Increase digital investment and drive business digital transformation with digital technology. Digital transformation is the general trend under the new round of scientific and technological transformation and industrial transformation. Digital technology and digital elements have become the core engines of digital transformation. In 2020, the "14th Five-Year Digital Economy Development Plan" issued by the State Council emphasized the importance of digital technology to promote industrial digitalization. The empirical results also show that digital investment has a positive effect on business performance. Therefore, businesses should follow the trend of development, actively embrace the cutting-edge digital technology, integrate digital technology with business production management activities and business scenarios, and realize the digital upgrade of business organizational structure, business processes, management decisions and business models.

Enhance the application of digital technology to business management and supply chain management, and improve the efficiency of business management and supply chain operation. The empirical results show that digital investment improves the digital operation and management of retail businesses, thus improving business performance. Therefore, retail businesses should make targeted digital investment, use digital technology to promote internal information exchange and knowledge sharing, promote digital improvement of business processes, reduce operating costs, improve business efficiency and gain digital competitive advantage. At the same time, we will invest in Internet of Things, cloud computing, artificial intelligence, blockchain and big data analysis technologies to build an efficient, flexible, transparent and intellectualized supply chain, and realize sales forecasting, intelligent replenishment, logistics route layout and intelligent analysis and decision-making to cope with the rapidly changing market demand, thus reducing warehousing and logistics costs and increasing business sales.

## REFERENCES

- [1] Chen, J. et al. (2020). Operations Management in the Digitization Era: From Empowering to Enabling [J]. Management World, 36 (02): 117-128+222. In Chinese.
- [2] Dong, L., Zhu,Y. (2022). The impact of digital transformation on the performance of retail businesses from the perspective of channel concentration [J]. Business Economics Research, (04): 26-29. In Chinese.

- [3] Vial, G . (2019). "Understanding Digital Transformation," *The Journal of Information System*, Vol.28, No.2, 2019, pp.118-144.
- [4] Guo, R., et al. (2021). The opportunity development mechanism of digital transformation businesses from the ecological perspective-based on the double case study of Haier and Suning [J]. *Foreign Economics and Management*, 43(09):43-67. In Chinese.
- [5] Huang, M., Wang, X.(2022). Research on the impact of digital transformation of retail businesses on operating efficiency-based on text mining analysis of annual reports of listed businesses [J]. *Journal of Beijing Technology and Business University (Social Science Edition)*, 37(01):38-49. In Chinese.
- [6] Li, X., Lu, H., Lin, M.(2020). Research on the Mechanism of Digital Transformation of Retail Industry [J]. *China Circulation Economy*, 34(04): 32-40. In Chinese.
- [7] Liu S., et al. (2021).Can digital transformation of business management improve input-output efficiency [J]. *Management World*, 37(05):170-190+13. In Chinese.
- [8] Qian,Y., Sun, X. (2021). Digital business model design: a case study of business digital transformation and business model innovation [J]. *Management Review*, 33(11): 67-83. In Chinese.
- [9] Qi, Y., Cai, C.(2020). Multiple effects of digitalization on the performance of manufacturing businesses and its mechanism [J]. *Learning and Exploration*, (07): 108 -119. In Chinese.
- [10] Qi,Y., Xiao, X.(2020). Business management reform in digital economy era [J]. *Management World* , 36(06): 135-152+250. In Chinese.
- [11] Shen, G., Yuan, Z.(2020). The influence of business Internet on business innovation and export in China [J]. *Economic Research*, 55(01):33-48. In Chinese.
- [12] Thomas, R. and Carsten, L. P. (2020). "Digitization capability and the digitalization of business models in business-to-business firms: Past, present, and future". *Industrial Marketing Management* 86: 180-190.
- [13] Wang, Q, W, C., Liu, Y.(2020). Retail digital transformation mechanism from the perspective of digital capability and value creation capability-a multi-case study of new retail [J]. *Research and Development Management*, 32(06):50-65. In Chinese.
- [14] Wang,Y., Li, H.(2017). Endogenous problems in management research and correction methods[J]. *Management Quarterly*, 2(03):20-47+170-171. In Chinese.
- [15] Wang, G., Zhi, X., Hu, G.(2016). Empirical analysis on the efficiency change of O2O transformation of retail businesses [J]. *System Engineering*, 34(11):98-104. In Chinese.
- [16] Wen, Z. Zhang, l., Hou, J., Liu, H.(2004). Mediator effect test procedure and its application [J]. *Journal of Psychology*, (05):614-620. In Chinese.
- [17] Wu, F., et al. (2021). Business Digital Transformation and Capital Market Performance-Empirical Evidence from Stock Liquidity [J]. *Management World*, 37(07): 130- 144+10. In Chinese.
- [18] Yi, L., Wu, F., Xu, S. (2021). Research on the Performance-driven Effect of Business Digital Transformation[J]. *securities market herald*, (08): 15 -25 +69. In Chinese.
- [19] Zhao, C., Wang, W., Li, X.(2021). How does digital transformation affect the total factor productivity of businesses [J]. *Finance and Trade Economics*, 42(07):114-12. In Chinese.