Analysis of Efficiency Measurement of China's Distribution Industry Development

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Abstract. The circulation industry currently has an important impact on economic transformation. In this context, this study compares the relevant literature in this field and uses factor analysis to measure the circulation efficiency value based on the relevant annual data from 2010 to 2020 in China, so as to arrive at the evolution trend of the circulation efficiency value from negative to positive in China, and explains this change.

Keywords: Trade Circulation; Factor Analysis; Circulation Efficiency.

1   Introduction

At present, although the scale of the circulation industry is growing rapidly, the quality of the circulation industry has not grown in parallel with the scale relatively speaking, which is mainly due to the abnormally high circulation cost and poor circulation speed. The low efficiency of circulation has been hindering the development of China's modern circulation industry, which shows that improving the efficiency of circulation can help change the current contradictions and problems of China's modern circulation industry, which can enhance the competitiveness of China's modern circulation industry. This paper selects indicators to measure the efficiency of circulation from three levels: turnover, scale and efficiency, to analyze and evaluate the current development of China's circulation industry in a relatively systematic and objective way.

2   Literature Review

Since the circulation of goods is an economic process, most of the factors in the circulation process, internal or external, affect the efficiency of circulation. Marx expressed that the circulation process of capital is the unity of the circulation process and the production process, and that the circulation process is ubiquitous in the economic process, which shows the critical role of the circulation process[1]. In summary, the increase of circulation efficiency indicates that the process of production, distribution,

exchange and consumption of commodities has less loss and faster turnover (Song and Zhang, 2003)[2,3,4,5].

For distribution efficiency the current mainstream measurement method is to measure the distribution efficiency of each region using the data envelopment analysis (DEA) method, including Wang XD and Wang SH (2016)[7], Wang T and Shi D (2021)[8] and other scholars. And when the factor analysis method is used to measure the circulation efficiency, the advantage is that it incorporates the micro aspects, i.e., the main financial indicators of circulation enterprises and other relevant indicators as indicators of the circulation process (Li JY and Yu P, 2019; Guo ST and Yu T, 2013)[6, 9] . Therefore, the factor analysis method gives a relatively more comprehensive picture of the distribution of output aspects. This paper use factor analysis to measure the efficiency of circulation in China in recent years based on data from 2010-2020.

3   Empirical analysis

3.1   Selection of Indicators

In this study, the empirical results of circulation efficiency in China for 2010-2020 were obtained by analyzing the eight basic indicators described in Table 1 of factor analysis using SPSS19. This paper will measure the distribution efficiency based on the connotation-defined distribution efficiency by selecting relevant indicators from three levels: turnover, scaleability and efficiency.

Table 1. Flow efficiency measurement index system.

Dimensional indicators	Basic indicators	Indicator Description	Variables
Turnover rate indicator	Current asset turnover ratio of wholesale and retail enterprises	Revenue from main business / Average total current assets	X_1
	Inventory rate of wholesale and retail enterprises	Total inventory/total sales	X_2
	Inventory turnover rate of wholesale and retail enterprises	Average cost of main operations/inventory balance	X_3
Scalability Metrics	Retail concentration	Total sales of retail enterprises above the limit / total domestic retail sales of consumer goods	X_4
	The degree of consumption of wholesale and retail industry	Total domestic retail sales of consumer goods	X_5

Beneficial indicators	Worker productivity	Value added of the wholesale and retail industry / labor input of the wholesale and retail industry	X_6
	Total Return on Assets for Wholesale and Retail Industry	Total profit / Average total assets	X_7
	Annual sales per capita in the wholesale and retail industry	Annual sales of retail and wholesale industry / number of employees in retail and wholesale industry in the year	X_8

3.2   Factor Analysis

Bartlett's spherical test and KMO sampling appropriateness test have been carried out before the factor analysis of each indicator, and the results are shown in Table 2.

Table 2. Results of KMO test and Bartlett's spherical test.

Kaiser-Meyer-Olkin metric for sampling adequacy		0.701
Bartlett's sphericity test	Approximate cardinality	134.431
	Degree of freedom	28
	Sig.	0.000

As can be seen from Table 2, the KMO test result is 0. 701 > 0.7 and the approximate chi-squared value of the Bartlett test is 134.431, corresponding to a probability of less than 1% significance level, thus indicating that the data is suitable for factor analysis.

The extracted values of the variance of the common factor in Table 3 showed that the extracted values of the variables were all greater than 0.65, and one principal component was extracted by principal component analysis, and according to total variance explained, the cumulative contribution of the variance has reached 81.422%, thus indicating that the extraction of one common factor is sufficient.

Table 3. Common factor variance and composition matrix.

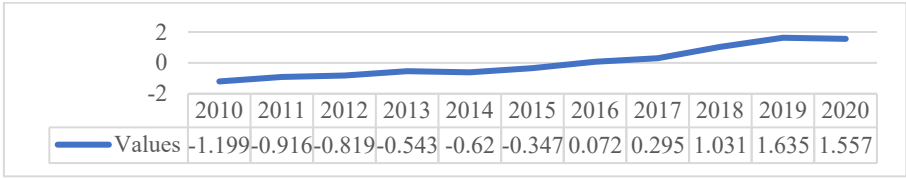| Common factor variance	Extraction	Component score coefficient matrix	Ingredient 1
Current asset turnover ratio of wholesale and retail enterprises	0.663	Current asset turnover ratio of industrial enterprises	-0.125

Inventory rate of wholesale and retail enterprises	0.799	Current asset turnover ratio of wholesale and retail enterprises	-0.137
Inventory turnover rate of wholesale and retail enterprises	0.772	Inventory rate of wholesale and retail enterprises	0.135
Retail concentration	0.695	Inventory turnover rate of whole-sale and retail enterprises	-0.128
The degree of consumption of wholesale and retail industry	0.908	Retail concentration	0.146
Worker productivity	0.960	Worker productivity	0.150
Total Return on Assets for Wholesale and Retail Industry	0.761	Total Return on Assets for Wholesale and Retail Industry	-0.134
Annual sales per capita in the wholesale and retail industry	0.956	Annual sales per capita in the wholesale and retail industry	0.150

From Table 3 it can be seen that the indicator with the greatest influence is X_8, indicates that the inventory rate of wholesale and retail enterprises has a greater impact on distribution efficiency. Its model can be expressed as follows:

$$Z = -0.125X_1 - 0.137X_2 + 0.135X_3 - 0.128X_4 + 0.146X_5 + 0.150X_6 - 0140.134X_7 + 0.150X_8 \tag{1}$$

4   Conclusion

Figure 1 shows that the trend of circulation efficiency in China between 2010 and 2020 is negative to positive, it shows that from -1.199 in 2010 to 1.557 in 2020, although the growth rate fluctuates up and down, but the overall trend of continuous growth, slightly declining in 2019-2020, is expected to continue to improve in the future.

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Values	-1.199	-0.916	-0.819	-0.543	-0.62	-0.347	0.072	0.295	1.031	1.635	1.557

Fig. 1. Flow efficiency values

Figure 1 shows that the evolutionary trend of circulation efficiency in China can be roughly divided into four stages:

2010-2012 is the first stage. Due to the after-effects of the inflationary shock in 2008, the growth was relatively slow. But the size of China's market, the emerging market demand space, which indicates that China's economic development potential is huge.

2012-2015 is the second stage, and although the circulation efficiency is still negative, its growth rate has become significantly faster. The 6th China Beijing Circulation Modernization Forum was held in 2012, which gathered experts, scholars and entrepreneurs from the theoretical and practical fields, and had a deep discussion on it[10].

2015-2019 is the third stage, when the efficiency of circulation turns from negative to positive and continues to grow steadily. The combination of the Internet, an emerging technology, and the circulation industry is a major breakthrough in the circulation industry.

2019-2020 is the fourth stage, China's circulation efficiency slightly decreased. In2019, the country attaches great importance to slow economic development to quickly inhibit the spread of the epidemic, but the impact is temporary and limited. China is a large country, resilient, with great potential and room for maneuver.

The above analysis gives the following recommendations for response:

First, strengthen the innovation of distribution enterprises and pay attention to technological progress. In terms of transforming the development of the distribution industry, attention should be focused on technological innovation so that emerging technologies can progress in full combination with distribution enterprises.

Second, strengthen the construction of distribution infrastructure to ensure a smooth and unhindered economic cycle. When the infrastructure of the distribution industry is perfected, the links in the distribution industry can be ensured to be relatively smooth, thus ensuring that the economic cycle is unhindered.

Finally, the business environment should be optimised and the quality of the distribution market should be taken into account. Focus on the role of business environment optimisation on the high-quality development of the distribution industry, and continue to help improve the business environment.

Acknowledgment

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