Research on the Evaluation and Promotion path of Modern Service Industry Competitiveness in Wenzhou City

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Abstract: Based on the data of five cities in Zhejiang Province in 2022, this paper makes a comprehensive evaluation and comparative analysis of the competitiveness of modern service industry in five cities by means of factor analysis. By calculating the competitiveness level of modern service industry, this paper objectively evaluates the position of modern service industry competitiveness of Wenzhou city in the whole province. The research shows that the competitiveness of modern service industry in Wenzhou city is in the middle level, while that in Hangzhou city and Ningbo city is the highest, and that in Zhoushan city and Lishui city is at a poor level; There is a significant positive relationship between the competitiveness of modern service industry and the level of economic development in Wenzhou city. Based on this, this paper puts forward some countermeasures and suggestions to promote the development of modern service industry in Wenzhou city.

1. Introduction

Modern service industry is an important driving force for the transformation of the global economy from "Industrial Economy" to "Service Economy"[1]. The 14th five-year Plan for the Development of the Service Industry, the report of the 20th CPC National Congress and the government work report all clearly put forward the need to speed up the development of the modern service industry and optimize the environment for the development of the service industry. In this context, enhancing the industrial competitiveness of the modern service industry is of great significance for upgrading the modern service industry, improving the quality of the modern service industry, transforming the mode of economic development, alleviating employment pressure, cultivating new growth points, and promoting the sound and rapid development of the national economy.

Domestic and foreign scholars' evaluation research on the competitiveness of modern service industry is mainly carried out from three aspects: the first is to evaluate the international competitiveness of a country's service industry[2-4]; the second is to study the competitiveness of a certain service industry[5-7], Engelbrecht proposed that the development of information service industry is the main factor affecting the development of modern service industry, especially for countries or regions with mature industrial structure[8]; the third is the research on the competitiveness of service industry among different regions[9-11]. To sum up, there are few studies on the evaluation of the competitiveness of modern service industry among cities in the province. Therefore, this paper takes the modern service industry as the research object, comprehensively evaluates the competitiveness of modern service industry in five cities of Zhejiang Province, and further studies the countermeasures to enhance the competitiveness of modern service industry in Wenzhou city.

As one of the three central cities in Zhejiang Province, Wenzhou city has developed steadily in modern service industry. During the 13th five-year Plan period, the development scale of Wenzhou's service industry expanded year by year. In 2020, the added value of the city's service industry reached 387.6 billion yuan, with an average annual growth rate of 10.2%, accounting for

56.4% of GDP. The position of the service industry as the main driving force of Wenzhou's economic growth has been further consolidated. In 2020, employees of modern service industry in Wenzhou city accounted for 40% of the employees in the whole society, becoming the main channel to absorb social employment. During the 14th five-year Plan period, Wenzhou steadily promoted the strategic plan of the 14th five-year Plan for the Development of Wenzhou's Service Industry, and built a national demonstration city of private economy, which will further stimulate and release the development potential of Wenzhou's service economy. However, with the high-quality development of the modern service industry in Wenzhou city, it is also faced with a series of new challenges, such as the weakening of the momentum of global economic cycle, the increasing downward pressure on the domestic economy, the spatial reconstruction and the low priority of the central urban area under the background of regional integration.

Therefore, this paper selects five representative cities in Zhejiang Province, namely, Hangzhou, Ningbo, Wenzhou, Zhoushan and Lishui. Through the comparative analysis of the competitiveness level of the modern service industry of the five cities in Zhejiang Province, we can objectively understand the main problems existing in the modern service industry in Wenzhou city, so as to provide decision-making basis and policy guidance for the development of the modern service industry in Wenzhou city.

2. Construction of Index system and Research methods

2.1. Construction of Index system

In order to evaluate the competitiveness of modern service industry in Wenzhou city scientifically and comprehensively, on the basis of existing research, this paper follows the principles of science, maneuverability, comprehensiveness, dynamics and guidance, and takes the basic competitiveness, scale competitiveness, benefit competitiveness and scientific and technological competitiveness of modern service industry as evaluation indicators, constructs the evaluation index system of the competitiveness of modern service industry. The index system contains 4 first-level indicators and 16 second-level indicators, as shown in Table 1.

Table1 Evaluation indicator system of modern service industry competitiveness.

	Name of First-level Indicator	Name of Second-level Indicator	Unit
Modern service industry competitiveness level	Basic Competitiveness	X_1 GDP per capita	Ten thousand yuan
		X_2 Urban per capita disposable income	Yuan
		X_3 Urbanization rate	%
		X_4 Public transport vehicles per 10,000 people	Standard table
		X_5 Per capita housing area	m2
	Scale Competitiveness	X_6 Modern service industry added value	Billion
		X_7 The proportion of added value of modern service industry to GDP	%
		X_8 Per capita investment in fixed assets of modern service industry	Ten thousand yuan
		X_9 Number of employees in modern service industry	Ten thousand people
	Efficiency Competitiveness	X_{10} Labor productivity in modern service industry	Yuan
		X_{11} Growth rate of modern service industry	%
		X_{12} Per capita modern service industry added value	Yuan
		X_{13} Growth rate of practitioners in modern service industry	%
	Technological Competitiveness	X_{14} Patent application volume	Piece
		X_{15} The proportion of R&D personnel in the employed population	%
		X_{16} The proportion of R&D spending in GDP	%

2.2. Data sources and evaluation methods

This paper mainly selects five prefecture-level cities such as Hangzhou, Ningbo, Wenzhou, Zhoushan and Lishui. Hangzhou and Ningbo are the top two prefecture-level cities in Zhejiang Province in GDP, while Zhoushan and Lishui are the last two prefecture-level cities in Zhejiang Province in GDP. The basis for this selection is to better compare and analyze the competitiveness of Wenzhou's modern service industry and put forward more targeted countermeasures and suggestions.

This paper obtains the original data from the "2022 Zhejiang Statistical Yearbook", the "2022 Statistical Yearbook" of five prefecture-level cities and the "National Economic and Social Development Statistical Bulletin" of each city, which not only ensures the authenticity of data acquisition, but also avoids the errors caused by different data types. In order to facilitate the statistical data and ensure the consistency of statistics, the scope of the modern service industry is defined to include the following 10 industries: information transmission, software and information services, finance, real estate, leasing and business services, scientific research and technical services, water, environment and public Facilities management, residential services, repairs and other services, education, health and social work, culture, sports and entertainment[12].

The common research methods of modern service industry competitiveness are Factor Analysis, Multiple Regression Method, Principal Component Analysis, Analytic Hierarchy Process, Grey Relational Analysis, The Entropy Method, Fuzzy Comprehensive Evaluation Method, etc. Among them, factor analysis has the following advantages over other methods: (1) It can simplify the process of analysis and calculation and simplify the complexity; (2) The extracted factors have nomenclature interpretation; (3) It can help explain the factor by rotation technique. Therefore, this paper uses the factor analysis method to analyze and evaluate the competitiveness of the modern service industry of the five cities in Zhejiang Province, and analyzes and improve the competitiveness level of modern service industry in Wenzhou city according to the ranking situation.

3. Empirical Analysis on the Competitiveness Evaluation of Modern Service Industry in Wenzhou city

3.1. Factor Analysis Process

Due to the selection of a large number of modern service industry competitiveness evaluation indicators and there may be a certain linear relationship between them. Therefore, before factor analysis, the collected data need to be tested by KMO and Bartlett sphericity test to test the applicability of factor analysis to this study. The test shows that the KMO value of the selected index in this paper is 0.713, which indicates that the effect of factor analysis is good. The accompanying probability of Bartlett sphericity test is 0 and it is known that the independence hypothesis of each variable is not valid, indicating there is a significant correlation between variables, which can be analyzed by factor analysis. In addition, the correlation coefficient matrix and the common degree table of variables show that the common degree of all variables is more than 0.8, indicating that the extracted factors contain most of the information of the original variables. the common factors extracted by factor analysis have strong ability to explain the economic indicators.

As shown in Table 2, according to the principle that the eigenvalues of variables should be greater than 1, three common factors are extracted from 16 variables, and their cumulative variance contribution rate is 94.122%. According to the principle that the cumulative variance contribution rate of common factors is greater than 85%, it can be considered that the first three factors can basically contain most of the information of 16 variables and reflect the competitiveness of modern service industries in 5 cities of Zhejiang Province as a whole. The effect of factor analysis is ideal.

Table 2 Factor contribution rate.

Common factor	Eigenvalue	Variance contribution (%)	Cumulative variance contribution (%)
1	10.186	68.662	68.662
2	2.065	15.907	84.569
3	1.368	9.553	94.122

The original factor load matrix is established for the three common factors extracted, and the variance maximum rotation method is used to rotate the factor load matrix. The rotated factor load matrix is given in Table 3.

Table3 Factor load matrix after rotation.

Indicator Name	Component		
	1	2	3
X_1 GDP per capital	.943	.286	-.039
X_2 Urban Disposable Income per capital	.916	.376	-.061
X_3 Urbanization rate	.904	.270	.323
X_4 Public Transport Vehicles per 10,000 people	.849	.321	.244
X_5 Housing area per capita	-.119	-.200	.832
X_6 Added Value of Modern Service Industry	.875	.535	.326
X_7 Added Value of Modern Service Industry as a Proportion of GDP	.106	.764	.244
X_8 Fixed Investments per capital in Modern Service Industry	.977	-.033	.104
X_9 Number of Employees from Modern Service Industry	.896	-.230	.401
X_{10} Productivity of labor in Modern Service Industry	.219	.864	-.338
X_{11} Growth Rate of Modern Service Industry	-.535	.019	-.477
X_{12} Added Value per capital of Modern Service Industry	.961	.579	.165
X_{13} Growth Rate of Number of Employees from Modern Service Industry	.183	.860	.196
X_14 Number of Patents Applications	.851	.305	.233
X15 R&D Personnel Account as a Proportion of the Employed Population	.885	.300	.247
X_{16} R&D Expenses as a Proportion of GDP	.830	.452	-.161

As can be seen from Table 3, the first main factor F1 has high load and interpretation ability on X_1, X_2, X_3, X_4, X_6, X_8, X_9, X_{12}, X_{14}, X_{15}, X_{16} and other indicators. Among them, X_1, X_2, X_3 and X4 mainly reflect the development foundation and the basic competitiveness of modern service industry; X_6, X_8 and X_9 present the development scale of modern service industry. X_{14}, X_{15}, and X_{16} measure the technological strength of modern service industry. Therefore, the first principal factor can be named as the development foundation and technological strength factor of modern service industry development.

The second principal factor has a significant load on X_7, X_{10}, X_{13} and other indicators, these three indicators mainly measure the development structure and benefits of modern service industry. Therefore, the second main factor can be named as the structure and benefit factor of the development of modern service industry.

The third principal factor has a large load on X_5 and other indexes. Index X_5 reflects the per capita housing area and reflects the basic environment for the development of modern service industry. Therefore, the third principal factor can be named as the basic environmental factor for the development of modern service industry.

3.2. Factor Scoring Process

The factor score coefficient matrix of modern service industry is obtained by regression analysis, and by multiplying the data in Table 2 with the cumulative variance contribution rate of each factor after rotation, the evaluation equation of modern service industry competitiveness of five cities in Zhejiang Province can be obtained. Thus, the comprehensive score of modern service industry in five prefectures and cities can be calculated.

Combined with the values in the above tables and the three main factor formulas, we can calculate the comprehensive score and ranking of the modern service industry of five cities in

Zhejiang Province, as well as the score and ranking of the three main factors, as shown in Table 4. According to the values in the table, the higher the value, the stronger the competitiveness of the modern service industry and the better its development. Among them, the positive value indicates that its modern service industry competitiveness is in the forefront of Zhejiang Province, and is higher than the average level of Zhejiang Province; the negative value indicates that its modern service industry is in a backward position, which is lower than the average level of Zhejiang Province.

Table 4 Ranking of the competitiveness of modern service industries in various cities.

City	F_1	Rank	F_2	Rank	F_3	Rank	F	Rank
Hangzhou	.888	3	.904	2	2.777	1	.980	1
Ningbo	2.176	1	.691	3	-.266	4	.875	2
Wenzhou	1.130	2	1.572	1	-.422	5	.635	3
Zhoushan	-1.202	5	.237	4	.213	2	-.586	4
Lishui	-1.047	4	-.856	5	.099	3	-.717	5

4. Analysis on the Competitiveness of Wenzhou City in the Modern Service Industries of the whole Province

In the comprehensive score ranking, Wenzhou is in the third place, with a comprehensive score of 0.635, which is also higher than the average level of Zhejiang Province, but there is still a certain gap compared with Hangzhou and Ningbo. As an important commercial city and regional central city along the southeast coast, Wenzhou has been in the forefront of Zhejiang Province in its economic development. During the 14th five-year Plan period, Wenzhou's modern service industry is in an important period of opportunity for high-quality development. We must seize the opportunity, optimize the supply structure of modern service industry, speed up the development of modern service industry to specialization, high-end, refinement and high quality, consolidate Wenzhou's dominant position in the development of modern service industry along the southeast coast, and enhance the competitiveness of Wenzhou's modern service industry. The cities of Zhoushan and Lishui in the province rank low, and their comprehensive scores are all negative, which is far lower than the average level of Zhejiang Province. From the comprehensive scores, we can see that there is still a large gap between these cities and Hangzhou, Ningbo and Wenzhou. The development of modern service industry in this region lags behind and needs to be improved.

From the ranking results of the main factors, we can see that in the first main factor, Wenzhou is in the second place, with a score of 1.130. In recent years, the modern service industry in Wenzhou has developed vigorously, relying on its superior geographical location and agglomeration effect, which has unique advantages for the development of private economy and attracting investment. Generally speaking, the economic base determines the superstructure, and the development of modern service industry in Wenzhou is determined by the level of economic development and scientific and technological strength. In the second main factor, Wenzhou ranked first with a score of 1.572. Although the development of modern service industry in Wenzhou is in the middle level, the employees of modern service industry are on the rise, indicating that Wenzhou attaches more importance to the training of talents in modern service industry in recent years, and has also issued a series of talent policies, such as rental subsidy, employment subsidy and so on. The modern service industry in Wenzhou is rising rapidly, and the function of modern service industry is also being further improved and improved. In the third principal factor, Wenzhou ranked fifth with a score of-0.422. Per capita housing area can reflect the basic environment of a city's development and provide basic conditions for the development of modern service industry. The consumption level of Wenzhou is too high, resulting in high housing prices and low housing space per capita.

Through the analysis, it is found that the three main factors that affect the competitiveness of modern service industry influence each other and jointly promote the competitiveness of modern service industry. As the first area of the development of China's private economy and the forward

position of reform and opening up, Wenzhou occupies an important position in the economic development of Zhejiang Province. Its important geographical location and unique resource advantages can achieve leapfrog growth through future pattern changes and conditions transformation. The above research results of modern service industry competitiveness evaluation based on factor analysis basically reflect the position of Wenzhou modern service industry in the whole province. The competitiveness of modern service industry is generally in the forefront of the province, which shows that the development basis, development structure and scientific and technological strength of modern service industry in Wenzhou are prominent, and the economic development of Wenzhou is changing from high-speed development to high-quality development. But at the same time, there is still a gap between the competitiveness of modern service industry in Hangzhou and Ningbo. How to further improve the competitiveness of modern service industry in Wenzhou is also the direction that Wenzhou modern service industry needs to pay attention to and develop during the 14th five-year Plan period.

5. Conclusion and countermeasure

5.1. Conclusion

Based on the data of five cities in Zhejiang Province in 2022, this paper makes a comprehensive evaluation and comparative analysis of the competitiveness of modern service industry in five cities by means of factor analysis. By calculating the competitiveness level of modern service industry, this paper objectively evaluates the position of Wenzhou modern service industry competitiveness in the whole province. The conclusions of the study are as follows:

(1) The competitiveness of modern service industry in Wenzhou is in the middle level, while that in Hangzhou and Ningbo is the highest and Zhoushan and Lishui is poor. From the above analysis and the comprehensive ranking of factor scores, we can see that the order is Hangzhou, Ningbo, Wenzhou, Zhoushan and Lishui. The comprehensive scores of modern service industry competitiveness are 0.980, 0.875, 0.635,-0.586 and-0.717 respectively.

(2) There is a significant positive relationship between the competitiveness level of modern service industry and the level of economic development in Wenzhou. Using the total GDP to measure the level of regional economic development, the total GDP of Wenzhou in 2022 is 802.98 billion yuan, which is lower than 1.8753 trillion yuan in Hangzhou and 1.57043 trillion yuan in Ningbo; while the total GDP in Zhoushan and Lishui in 2022 is 195.13 billion yuan and 183.09 billion yuan, their economic development level is in the last place in Zhejiang Province, and the development level of modern service industry is also at a low level.

5.2. Countermeasure

For Wenzhou, although the competitiveness of modern service industry is higher than that of Zhoushan and Lishui, there is still a gap compared with Hangzhou and Ningbo. Therefore, in order to enhance the competitiveness of modern service industry, Wenzhou needs to do the following: First, it should make use of its unique geographical advantages to optimize the industrial layout of modern service industry and enhance the development level of modern service industry, aiming to provide the necessary funds and platform for the development of modern service industry. Second, it should increase investment in scientific and technological innovation funds and innovative talents in modern service industries. Third, it should make up for the shortcomings of the development of modern service industry and optimize the development level of modern service industry. Fourth, it should increase the cultivation of the main body of modern service industry in Wenzhou to enhance the growth ability of modern service industry. At the same time, it is necessary to strengthen cooperation with cities within and outside the province, such as Hangzhou, Ningbo, Zhoushan and Lishui, strengthen internal and external linkages, and strive to achieve interactive and coordinated development of modern service industries.

Acknowledgements

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