Case Study on Key Influencing Factors of Modern Service Industry Development

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Abstract. In the process of industrial structure adjustment and economic development model innovation, the role and status of modern service industry are becoming increasingly important. Shenzhen Municipal People's Government had paid great attention on the development of modern service industry. On one hand, modern service industry has been quite large and mature, and on the other hand, there are problems of insufficient in total volume, relatively narrow industry field and somehow inadequate industry structure. Based on rational choosing and building an influencing indicator system, this paper tries to analysis the development of modern service industry in Shenzhen. Through using methods such as cointegration analysis, Granger causality test and multiple linear regression, combined with the relevant data collected, we found that the foreign direct investment and the investment level of modern service industry are the key factors. Therefore, this paper suggested that the development of modern service industry in Shenzhen might improve on expanding foreign investment, strengthening the investment level of modern service industry, and upgrading professional talents.

Keywords: Modern service industry · Influencing factors · Multi-Regression analysis

1 Introduction

The modern service industry is a service industry that maintains the continuity of the industrial production process, promotes industrial technological progress and industrial upgrading, and improves production efficiency to provide guarantee services. It is the result of heightened industrial structure and economic service.

In the background of the continuous deepening of the industrial structure adjustment and economic development model innovation in Shenzhen, the role and status of the modern service industry are becoming increasingly important. Shenzhen Municipal People's Government had formulate policies to strengthen the development of modern service industry. As early as 2007, "Several opinions on accelerating the development of our city's high-end service industry" had been put forward. In 2012 and 2017,

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"The 12th Five-Year Plan for the Development of Modern Service Industry in Shenzhen" and "The 13th Five-Year Plan for the Development of Modern Service Industry in Shenzhen" came out. In 2018, "Shenzhen Strategic Emerging Industries Development Special Fund Support Policy" was carried out to support the Strategic Emerging Industries. In 2019, the added value of modern service industry was 1,210.147 billion yuan, an increase of 12% with last year. Among them, the operating income of information transmission, software and information technology services increased by 16.5%, transportation, warehousing and postal services increased by 9.1%, leasing and business services increased by 11.2%, and scientific research and technical services increased by 11.9%.

From the perspective of development direction, the application of technologies and concepts in Shenzhen, such as cross-border finance, factor markets, wealth management, supply chain management, e-commerce logistics, and the internet of things have transformed the modern service industry into a high-tech and high-value-added high-end direction. However, the modern service industry in Shenzhen has problems such as insufficient in total volume, relatively narrow industry field, and insufficient employment potential. It also faces many difficulties such as insufficient internal structure optimization, severe factor constraints, and high competitive pressure. It is the primary issues if Shenzhen Municipal People's Government wants to effectively improve the modern service industry system, achieve the optimization and upgrading of industrial structure and clarify the key factors affecting.

2 Literature Review

2.1 Concepts and Characteristics of Modern Service Industry

Modern service industry appears with the concepts of "knowledge-intensive service industry", "emerging service industry" and "production service industry". It is characterized by knowledge-based, highly R & D-intensive and high value-added knowledge. Wang X Q et al. (2011) analyzed the modern service industry in the United States, Japan and Singapore and divided the modern service industry into three types, such as a native type, an embedded type and an exogenous type [1]. Wu X B et al. (2014) used the data from China's GEM modern service industry and cluster analysis method, and then found that the modern service industry had six typical business models [2]. According to the National Development and Reform Commission's "Industrial Structure Adjustment Guidance Catalogue"(2019, Exposure Draft), the modern service industry includes following nine major industries: (1) information transmission, computer services and software industry; (2) financial industry (3) real estate; (4) leasing and business services; (5) scientific research, technical services and geological exploration; (6) water conservancy, environment and public facilities management; (7) education; (8) Health, social security and social services; (9) culture, sports and entertainment.

2.2 Influencing Factors of Modern Service Industry

For the interaction between modern service industry and other industries, some scholars put forward their opinions. Based on the review of the development of modern service

industry in Wuhan, Kuang Y F (2015) found that the development of modern service industry could effectively promote the transformation and upgrading of industrial structure, and then promote regional economic growth [3]. Li J M et al. (2013) believed that the development of modern service industry was a necessary condition for economic structure optimization and adjustment [4].

For the influencing factors, different scholars used different methods and found differentiated indicators. Hou S G (2014) comprehensively analyzed the nine influencing factors of modern service industry and found that the impact of industrial structure was the most significant [5]. Liu T (2010) used multiple regression model to examine the influencing factors of the development and changes of modern service industry in Hunan Province, and found that the output value of modern service industry were related to per capita GDP and disposable income of urban residents, and the latter two variables had negative impact on the former one [6]. Through combined with the data of modern service industry development in some provinces and used multi-factor analysis model, Ma F H (2016) pointed out that economic growth and urbanization process, residents' consumption and government expenditure all significantly affected the development of modern service industry [7]. With using multiple linear regression method and data from China's modern service industry in 2010, Li D M (2011) verified that per capita disposable income was a decisive factor affecting the development of modern service industry [8]. Mao YY (2010) divided the factors that affecting the development of modern service industry into tangible and intangible aspects. The tangible factors included infrastructure conditions, urbanization level, consumption demand, government related policies and secondary industry development status, while the intangible factors were mainly including external economic influence, labor cost and marketization degree [9]. Taking into account the knowledge of the modern service industry, Li J (2010) summarized the factors as residents' consumption status, overall economic development level, information level, industrialization level, urbanization level and internationalization level [10]. Zeng X F et al. (2013) studied the influencing factors of the regional service industry, and concluded that the basic knowledge structure, technological environment, social environment and technological support were the main factors affecting the development of modern service industry [11]. Through empirical analysis, Bai J (2018) found that foreign investment, urbanization, and government spending had a positive impact on the competitiveness of modern service industries [12]. Wang M K (2017) used principal component regression analysis and found that factors such as industrialization rate, GDP per capita, number of employees in the service industry, and actual use of foreign capital affected the improvement of the competitiveness of the service industry [13]. Using partial least squares regression analysis and data collected from Henan Province, Tian ZZ (2019) found that the level of urbanization, information, government role, innovation capability and economic development had a significant impact on the development of producer services [14]. Based on the perspective of "added value-participation-division of labor", Zheng G J et al. (2018) studied the competitiveness of the service industry, research results showed that the division of labor in the global value chain of the service industry and the international division of labor participation were the most important and the most Significant factors [15]. By selecting explanatory variables such as manufacturing agglomeration, government protection, urbanization level, human capital, and

information level, and used spatial constant coefficient models, Zheng C J et al. (2017) analyzed the influencing factors of knowledge-intensive service industry development in Zhejiang Province [16]. Through an empirical analysis, Hong W Y (2015) found that the factors affecting the international competitiveness of the high-tech service industry in China and the United States included the number of high-tech service industry employees, the level of residents 'consumption, the level of residents' consumption, and the amount of investment in fixed assets in the high-tech service industry [17].

2.3 Evaluation and Empirical Research on the Development of Modern Service Industry

Shen X P (2012) comprehensively introduced the composition and characteristics, development environment and basic conditions of Shenzhen's modern service industry. Through the application of modern service industry added value as a percentage of GDP, growth contribution rate, economic growth driving force and other factors, the contribution of modern service industry to Shenzhen's economic growth was discussed, and its future development in terms of development goals and key areas were prospected [18]. Zhang H M et al. (2018) measured service industry development level in the Guangdong-Hong Kong-Macao Greater Bay Area. By using indicators such as rationalization of service industry structure, industry efficiency level and service industry structure heightening, and GMM model, the causality between the service industry development level in the Bay Area and the coordination level of cities [19]. Wu J X (2019) proposed relevant evaluation indicators based on the Porter Diamond Model and analyzed the competitiveness of China's science and technology service industry using an analytic hierarchy process [20]. Kang J et al. (2015) used principal component analysis to compare the competitiveness of the service industry in three different stages of cities in the Yangtze River Delta [21]. Zhang S J et al. (2016) used the annual data of the "BRICS" from 2009 to 2013, and factor analysis method to compare the international competitiveness of service industries [22]. Wang Y et al. (2018) explored the service industry development level of provinces and regions along the "Belt and Road" in China using factor analysis [23].

2.4 Comments

In general, the study on modern service industry is quiet mature, and the empirical researches using various data and methods are abundant. For example, in the influencing factors and evaluation research of modern service industry development, various indicators such as residents' consumption status, overall economic development level, information level, industrialization level, per capita GDP and disposable income of urban residents, etc., had constructed for analysis from different angles. However, the model setting and indicator system construction have not unified yet. At the same time, there is relatively little research focused on Shenzhen. Based on this, in order to promote Shenzhen's modern service industry development and put forward corresponding countermeasures and suggestions, this article intends to take Shenzhen's modern service industry as the object, select the latest and detailed data, and discuss its development status and key influencing factors.

3 Influencing Factor Model and Index of Modern Service Industry Development

3.1 Construction of Influencing Factor Index

From the "Diamond Model" put forward by Michael Porter, the international competitiveness of an industry mainly depends on four key factors and two auxiliary factors. Four key factors include demand conditions (driving force), factor conditions (human resources, knowledge resources, capital and other factors), related and supporting industries (strongly supported), corporate strategy, institutions, and competitors. While two auxiliary factors are the government and opportunities. Four key factors and two auxiliary factors jointly affect the industrial development and competitiveness. Together with the results of Mao YY(2010) and Wang J (2018), the factors that influencing the development of modern service industry can be subdivided into tangible factors and intangible factors [9, 12]. Tangible factors mainly refer to factors with material form, including capital investment, technological improvement, and infrastructure construction. Intangible factors are mainly factors with no specific form, including personnel literacy, consumption level, and government philosophy and so on. According to the attributes of modern service industry, and by summarizing the aforementioned research, the following indicator system is constructed. The value added of modern service industry (MSVA) represents the development level of modern service industry Table 1.

3.2 Descriptive Statistics

The original data is collected from the Shenzhen Statistical Yearbook and related statistical bulletins (2001-2020), and some scattered ones are compiled from the website of the Statistics Bureau. For all variables, value are collected from 2000 to 2019, which last twenty years. The value added of modern service industry (MSVA) acted as the dependent variable of the evaluation model. Other influencing factors treated as independent variables. Through logarithmic processing all variables, we use the logarithmic value of them Table 2.

3.3 Stationarity Test, Cointegration Test and Granger Causality Test

For time series data, the stationarity test is an indispensable link. The co-integration test is to verify whether there is a co-integration relationship between those influencing factors as independent variables and modern service industry development level as dependent variables, before performing multiple regression analysis. While granger causality test is to verify whether each factor has a correlation with the dependent variable, and it can clearly verify which variable caused the change of which variable.

Stationarity Test. Using ADF method to check the stationarity of time series. Result showed the difference in the dimensions get the significant result, which means that these variables are all second-order single integers. Result of the unit root test can found in the following table:

Table 1. Indicator system of modern service industry development

Type	Name	Content	Calculation method
Tangible factors	Modern Service Industry Investment Level (MSII)	Modern service industry investment status indicator	The proportion of service industry fixed asset investment in total investment
	Population density (PD)	Urbanization rate indicator	Urban population density
	Foreign direct investment (FDI)	Opening up indicator	Actual use of foreign capital
	Employees in modern service industry (PEMS)	Labor indicator	Number of employees in modern service industry
Intangible factor	Total retail sales of consumer goods per capita (PTRS)	Spending power indicator	Total retail sales of consumer goods per capita
	Per capita general public budget income (CPBI)	Government fiscal level indicator	Per capita general public budget income
	Per capita disposable income (PDGI)	Income level indicator	Per capita disposable income
	GDP per capita (CGDP)	City development level indicator	GDP per capita

From the table above, it can easily find that Lncgdp is stable in the level, while the Lnptrs and Lncpbi are not stable in the level and in the difference. After the difference, other variables are stable and are second-order single integers Table 3.

Cointegration Test. Results of unit root test show that Lnmsva and Lnpdgi, Lnmsii, Lnpd, Lncgdp, Lnfdi and Lnpems are all second-order single integers, and there may be a long-term equilibrium relationship between variables. Since it is a multivariate cointegration adjustment, we applied the Johansen test to inspect the cointegration relationship among them. Co-integration results proved that the co-integration rank of the stationary variable (Lnpdgi, Lnmsii, Lnpd, Lncgdp, Lnfdi and Lnpems) are all 1. That is, these six variable and Lnmsva exist separately and there is only one cointegration relationship. In addition, from the value of each cointegration parameter vector, Lnpdgi, Lnmsii, Lnpd, Lncgdp, Lnfdi and Lnpems have a long-term equilibrium relationship with the vector Lnmsva.

Granger Causality Test. The results of the cointegration test prove that there is a correlation between the selected variables and dependent variable. It is not clear who caused the specific variables and the dependent variable. Then, use the Granger causality test method to check the influencing relationship between variables. After selecting the

Table 2. Descriptive statistics of indicators (logarithmic value, from 2000 to 2019)

Variable name (unit)	Average value	Standard deviation	Minimum value	Maximum value
Value Added of Modern Service Industry (MSVA)(100 million yuan)	4353.59	3532.24	607.84	12101.47
Per capita disposable income (PDGI)(10 thousand yuan)	35520.2	12753.68	21494.00	62252.00
Modern Service Industry Investment Level (MSII)(%)	77.14	5.7979	62.65	85.99
Population density (PD)(10 thousand people per square kilometers)	4953.03	986.82	3348.04	6727.91
GDP per capita (CGDP)(10 thousand yuan)	106446.5	55078.69	33276	193211
Foreign Direct Investment (FDI)(100 million yuan)	893.13	453.66	121.67	3653.48
Number of employees in modern service industry (PEMS)	145.49	72.31	52.56	299.1
Total retail sales of consumer goods per capita (PTRS)	30162.7	14235.42	11021	50013
Per capita disposable income (PDGI)	13178.25	9384.49	3328	9965

granger causality test with second-order lag, all the results begins to get the significance. Results showed that Lnpdgi, Lnmsii, Lnpd, Lncgdp, Lnfdi, Lnpems are the reason that affects the vector Lnmsva.

3.4 Multiple Linear Regression

Co-integration and Granger causality test that confirmed these important factors had significant influence on the development level of modern service industry, and showed the causal relationship between them, while the affecting size was not yet determined. Construct a multiple regression model and analyze each influencing factor and the development level of modern service industry. Choose the development level of modern service industry (Lnmsva) as the dependent variable, and other factors as independent variables Table 4.

Table 3. Results of unit root test

Test variable	ADF Test(P-Value)	Stationary
Lnmsva Dlnmsva	−0.990541(0.7346) **−3.133171(0.0411*)**	unstable **stable**
Lnpdgi Dlnpdgi	0.535625(0.9833) **−4.043027(0.0069**)**	unstable **stable**
Lnmsii Dlnmsii	−1.597686(0.4643) **−5.126838(0.0008***)**	unstable **stable**
Lnpd Dlnpd	−1.703873(0.4095) **−3.564762(0.0180**)**	unstable **stable**
Lncgdp Dlncgdp	**−3.185447(0.037*)** −1.802981(0.3671)	**stable** unstable
Lnfdi Dlnfdi	−1.225460(0.6408) **−3.692236(0.0147**)**	unstable **stable**
Lnpems Dlnpems	−0.600491(0.8486) **−4.454073(0.0030**)**	unstable **stable**
Lnptrs Dlnptrs	−2.336485(0.1721) −1.788217(0.3737)	unstable unstable
Lncpbi Dlncpbi	−0.396755(0.8912) −2.557374(0.1196)	unstable unstable

Note: *, **, *** means significant at the confidence level of 10%, 5% and 1%

Table 4. Results of the multiple linear regression

Variable	C	Lnpdgi	Lnmsii	Lnpd	Lncgdp	Lnfdi	Lnpems
Coefficient	**−13.91283** (0.0224)	**0.2949** (0.02258)	**0.52758**** (0.0319)	0.9183 (0.2675)	**1.0709***** (0.0003)	**1.4206**** (0.0443)	0.3078 (0.3948)

Note: *, **, *** means significant at the confidence level of 10%, 5% and 1%

From the results of the regression equation, the regression-fitting coefficient R^2 is 0.9955, the F value is 485.59, the equation passes the significance test, and the multiple regression equation is valid. Factors such as the per capita disposable income of urban residents (Lnpdgi), the level of investment in modern services (Lnmsii), the level of GDP per capita (Lncgdp), and foreign direct investment (Lnfdi) have significantly affected the development of modern services (Lnmsva). Among them, the level of significance brought by GDP per capita is the best.

From the perspective of influence, all factors have a positive impact on the development level of modern service industry. In terms of impact level, foreign direct investment (Lnfdi) has the highest impact level. When foreign direct investment increases by 1 percentage point, the value added of the modern service industry increases by 1.42 percentage points. This followed by level of GDP per capita (Lncgdp), level of investment in modern services (Lnmsii), and level of per capita disposable income of urban residents (Lnpdgi), with coefficients of 1.0709, 0.5275, and 0.2949, respectively. When each variable increases by 1 percentage point, the level of modern service industry increases by 1.07, 0.52, and 0.29 percentage points, respectively.

4 Conclusion and Suggestion

The vigorous development of modern service industry in Shenzhen has promoted development and transformation of the social economy, and then become the engine of regional

economic growth. However, it still faces related problems, such as weak growth and excessive dependence on a certain industry. At the same time, the impact of the new crown epidemic (NCP, COVID-19) this year has also challenged the pace of development in Shenzhen. Combining the above research, this article believes that:

Optimize the level and structure of foreign direct investment to better support the development of modern service industries. Use foreign direct investment to increase the investment level of modern service industry, thereby optimizing the development structure of modern service industry and upgrading the level and level of modern service industry in Shenzhen.

Promote the investment level and structure of government investment on service industry, and then support the high-quality development of modern service industry. Strengthen the leading role of government on the investment, then guide more and better capital invest into the modern service industry. Try to expand its fields and to optimize its structure, thus to build a more innovative and dynamic development pattern of the modern service industry.

Increase policy support for finance, taxation, capital and talents. From the aspect of talents, pay attention to improve the number and quality of employees in the modern service industry. In terms of finance and land, strengthen the expenditure of fiscal expenditure in the modern service industry.

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References

1. Wang, X., Liang, W.: Research on the aggregation model and its structure mechanism of modern service industry. Com. Res. **11**, 92–100 (2011)
2. Xiaobo, W., Yao Mingming, W., Dong, Z.: The classification of business model from the value network perspective: evidence from the modern service industry. J. Zhejiang Univ. Humanit. Soc. Sci. **2**, 64–77 (2014)
3. Kuang, Y.: An Empirical Study on the Relationship between Modern Service Industry, Industrial Structure and Economic Growth——Taking Wuhan as an Example, 1, 54–59 (2015)
4. Jianmin, L., Yuechun, C.: Research on the optimizing mechanism of modern service industry to industrial. Structure **9**, 10–16 (2013)
5. Hou Shouguo, D., Zifang, F.P.: Research on the development path of modern service industry based on principal component analysis. Stat. Dec. **7**, 140–142 (2014)
6. Ting, L., Jie, W.: An empirical study on the development of modern service industry in hunan province. Econ. Geogr. **3**, 466–471 (2010)
7. Fenghua, M.: Service industrial structure change in china: measures based on four dimensions. Econ. Manag. **2**, 26–33 (2016)

8. Daming, L., Quanzhang, X.: Research on the factors of regional differences in modern service industry development. J. Zhongnan Univ. Econ. Law **4**, 17–22 (2011)
9. Yuanyuan, M.: Research on the development status and influencing factors of modern service industry in jiangsu province. Yangzhou University, Yangzhou (2010)
10. Juan, L.: An analysis of the factors influencing the development of china's modern service industry. Comm. Res. **2**, 112–115 (2010)
11. Xiaofei, Z., Lvwei, X.: Research on influencing factors of knowledge-intensive service industry. Sci. Technol. Prog. Policy **30**, 53–56 (2013)
12. Bai, J.: Research on the Competitive Power and Influencing Factors of the Modern Service Industry in Jilin Province. Jilin University of Finance,Changchun (2018)
13. Wang, M.: Research on Hubei Province Service Industry Competitiveness and Its Influencing Factors. Huazhong University of Agriculture, Wuhan (2017)
14. Zhenzhong, T.: An empirical study on the influencing factors of the development of producer services. Stat. Dec. **35**, 112–115 (2019)
15. Guojiao, Z., Chunrong, Y.: A re-examination of the competitiveness of china's service industry and its influencing factors-based on the perspective of "value-added-participation-division of labor". Econ. Vis. **2**, 17–18 (2018)
16. Joanna. Competitiveness in International Trade in Knowledge-Intensive Services–The Case of Poland, Comparative Economic Research, 17, 75–89 (2014)
17. Hong, W.: Comparative Study on the International Competitiveness of Chinese and American High-tech Service Industry and Its Influencing Factors, Hefei. Anhui University of Finance (2015)
18. Shen, X., Tan, L., Xiao, C., Gong, J.: Report of Shenzhen Economic Development, Beijing: Social Sciences Academic Press, pp. 177–187 (2012)
19. Zhong, Y., Hu, X.: The construction and system innovation of the Guangdong-Hong Kong-Macao greater bay area: theoretical basis and implementation mechanism. Economist **12**, 50–57 (2017)
20. Gai, K., Yuming, S., Kun, L.: The evaluation and spatial-temporal evolution of urban service industry competitiveness in yangtze river economic region. J. Sichuan Norm. Univ. Nat. Sci. **3**, 452–459 (2015)
21. Grover, A.G., Sebastian, S.: Trade in services competitiveness: an assessment methodology. J. Int. Comm. Econ. Policy **5**, 120–136 (2014)
22. Shaojie, Z., Hong, L.: The comparative evaluation study of international competitiveness of service industry in BRICS. China Soft Sci. **1**, 154–164 (2016)
23. Wang, Y., Weijin Suntao, Z.: Study on the development and optimization of regional service industry under the background of B & R initiative. China Soft Sci. **5**, 101–109 (2018)