Research on the Influencing Factors of China's Service Trade International Competitiveness Based on Michael Porter diamond Model

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Abstract. Trade data is the most important macroscopic manifestation of a country's economic situation. Therefore, based on the Porter Diamond model, this paper makes an overall analysis of the four main factors affecting China's service trade. After a detailed analysis of its correlation coefficient, the relationship between the four factors and the competitiveness of China's service trade was discussed. Finally, after comparing the impact of China's service trade development on itself and the world, the corresponding policies and recommendations were put forward.

1. The Development of China's trade in service

From the perspective of the world, the prosperity of service-oriented economy is a remarkable feature of the economic power in this era. As a mode of trade achieving wealth growth with less cost of resources, trade in service is increasingly favoured by the world's major economies. Under the development motivation of changing the mode of economic growth, it is an effective way for China surmounting from the trade nation to the trade powerful nation to speed up the development of trade in service and improve the competitiveness of domestic trade in service.

By the end of 2018, China's exports of service trade reached US $260.4 billion, an increase of 14.6 per cent over the same period last year. Compared with 75% of GDP in the United States, 60% in Europe and 56% in India, China's exports of trade in service are increasing year by year, but they still account for less than 40%. Obviously, China's service trade still has a large growth space.

Table 1. 2000-2018 China's import and export of service trade ($100 million)

| Year | Total export | Total trade | Balance | Year | Total export | Total trade | Balance |
|------|--------------|-------------|---------|------|--------------|-------------|---------|
| 2000 | 301          | 359         | -58.00  | 2010 | 1702         | 1922        | -220    |
| 2001 | 329          | 390         | -61.00  | 2011 | 1821         | 2370        | -549    |
| 2002 | 394          | 461         | -67.00  | 2012 | 1905         | 2801        | -896    |
2003 464 549 -85.00 2013 2106 3291 -1185
2004 621 716 -95.00 2014 2222 3821 -1599
2005 739 832 -93.00 2015 2176 4330 -2154
2006 914 1003 -89.00 2016 2083 4492 -2409
2007 1216 1293 -77.00 2017 2272 4658 -2386
2008 1465 1580 -115.00 2018 2604 5124 -2520
2009 1286 1581 -295.00

a State administration of foreign exchange of China

From table 1, the total volume of imports and exports of China's trade in service increased from US $66 billion in 2000 to US $772.8 billion in 2018, a growth rate of 995 per cent. Thus it shows that with the development of China's economy, its service trade industry has made great achievements. However, there exist a lot of problems in services trade, of which the main one is that "knowledge and capital intensive" industry and service trade is still underdeveloped. The deficit of $252 billion remains a big challenge for China's rapidly growing trade in services.

1.1. Traditional service trade industry in China
The traditional service trade industry (transportation service and tourism service) is an important pillar to promote the growth of China's overall service trade. In 2017, imports of transport services accounted for 28.67% of total imports, and tourism services accounted for 39.08% of total imports. Together, the two accounted for more than 50% of China's total imports.

Table 2. Import and export balance of China's transportation and tourism services in 2010-2018 ($100 million)b

|       | 2011   | 2012   | 2013   | 2014   | 2015   | 2016   | 2017   | 2018   |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|
| Transportaion | -448.7 | -469.5 | -566.8 | -579.06 | -468.0 | -468.1 | -532.8 | -641.5 |
| Tourism     | -241.2 | -519.5 | -769.2 | -1832.7 | -2048.1 | -2170.2 | -2230 | -2271.6 |

b China Ministry of Commerce Database

According to the statistics (Table2), transportation and tourism services are the main areas of China's trade deficit. The most direct reason is that the number of outbound tourists in China is increasing year by year, while the number of inbound tourists is decreasing year by year. That is because the mode of China's traditional tourism service industry is relatively backward; now the world service industry has been transforming to the technology-intensive and implementing modern management model, so there is still some distance between the service degree of China's service industry and the world’s.

1.2. Emerging service trade industry in China
In recent years, with the development of digital economy, the Chinese government has made great progress on the high-end service industry. Under the strong support of policies, the service export volume of China's high-end industries increases year by year. In the field of e-commerce, communication services trade, culture and tourism industry a certain degree of international competitiveness has formed.

2. Establishing "diamond model"

2.1. The Application of Diamond Model to the Analysis of competitive advantage in Service Trade
According to Porter's theory of competitive advantage, there are six factors determining the competitiveness of a country's industry. Factor conditions, demand conditions, related and supporting industries, strategic organizations of enterprises and their competition in the same industry are the four
basic factors. The other two are the opportunities a country obtained and the role the government played, which are auxiliary factors.

This theory applies not only to trade in goods, but also to the analysis of trade in service in China. The competitiveness of an enterprise is mainly reflected in import and export. For example, a large amount of import and export can indicate that the enterprise has advantages in competition. Introducing “Michael Porter diamond Model” theory into China’s service trade is beneficial for analysing the main factors affecting the competitiveness of China’s service trade, and also provide a theoretical basis for China's service trade status in international competition.

2.2. Model construction

A country's service trade competitiveness is embodied in the share of the country's service trade exports in the world market, that is, the greater the export volume, the stronger the international competitiveness. Therefore, value of exports (EXS) is regarded as the explanatory variable of the whole model.

Based on the analysis of "diamond model", the main factors affecting EXS are selected.

- Select the labour force as the representative of the factors of production. Specifically, use the number of employment in the tertiary industry ($X_1$) as the measurement standard.
- The competitiveness of an industry revealing in the world must start with the domestic demand. With a specific business system, enterprise structure, and stable demand one can calmly face the international competition. For demand, we choose a gross domestic product ($X_2$) as its measuring standard.
- Since the service trade raised after the trade in goods, the prosperity of trade in goods plays an important role in the promotion of trade in services. Chinese goods trade exports ($X_3$) and the level of service trade development ($X_4$) are selected as an indicator of measure related support industry; service trade development level is signified by the percentage of the tertiary industry output value expressed gross national product (GNP).
- Use the degree of openness of China's service trade ($X_5$) and the amount of foreign direct investment ($X_6$) to measure the strategic structure of the enterprise and the competition of the same industry. For the degree of openness, the two indexes of the proportion of the total import and export volume of service trade in GDP is regarded as an indicator of the fourth factor.
- The government's investment in science and technology funding ($X_7$) indicates government support for trade in services. Thus, a multiple linear regression model is established based on the diamond model:

$$EXS = \alpha_0 + \alpha_1 X_1 + \alpha_2 X_2 + \alpha_3 X_3 + \alpha_4 X_4 + \alpha_5 X_5 + \alpha_6 X_6 + \alpha_7 X_7$$

(1)

Because the selected independent variables are not necessarily linear with the dependent variables, all of them are in logarithmic form, and the equation becomes:

$$\ln EXS = \alpha_0 + \alpha_1 \ln X_1 + \alpha_2 \ln X_2 + \alpha_3 \ln X_3 + \alpha_4 \ln X_4 + \alpha_5 \ln X_5 + \alpha_6 \ln X_6 + \alpha_7 \ln X_7$$

(2)
The use of sections to divide the text of the paper is optional and left as a decision for the author. Where the author wishes to divide the paper into sections the formatting shown in table 2 should be used.

2.3. Improved the model

| Variable | ADF test value | Critical value (5%) | P values | Conclusion |
|----------|----------------|---------------------|----------|------------|
| Ln EXS   | -0.68725       | -2.85042            | 0.8592   | Nonstationary |
| LnX1     | 3.33520        | -1.96208            | 0.9523   | Nonstationary |
| LnX2     | -1.69732       | -2.87645            | 0.4325   | Nonstationary |
| LnX3     | -0.34723       | -2.87645            | 0.8912   | Nonstationary |
| LnX6     | -1.58964       | -2.87048            | 0.5011   | Nonstationary |
| LnX4     | 1.94812        | -1.94017            | 0.9972   | Nonstationary |
| LnX5     | -2.03627       | -2.87645            | 0.1842   | Nonstationary |
| LnX7     | -0.83491       | -2.87645            | 0.7831   | Nonstationary |

Firstly, the time series stability test of variables (ln EXS, lnX1, lnX2, lnX3, lnX4, lnX5, lnX6, and lnX7) is carried out. It can be seen from the table 4 that under the 5% significance level, there is a unit root in the horizontal sequence, and the first-order difference form does not have a unit root, which is nonstationary.

Then, according to the $T$ test, the variables that have less than 1% significance on the export value of service trade (EXS) are excluded.

| Variable | Regression coefficient | Standard error | Student's t test | P value |
|----------|------------------------|----------------|------------------|---------|
| C        | 4.65235                | 1.27463        | 3.84978          | 0.0008  |
| LnX1     | -1.16734               | 0.22320        | -6.51245         | 0.0000  |
| LnX2     | 0.80213                | 0.09874        | 8.33964          | 0.0000  |
| LnX3     | 0.49953                | 0.05368        | 9.65897          | 0.0003  |
| LnX5     | 0.45167                | 0.06018        | 7.65427          | 0.0000  |

As shown in Table 5, the decisive coefficient $R^2$ is 0.98981 and the adjusted decisive coefficient $R^2$ is 0.98792. The simulation degree is high, and the F statistic is 7652.387 and the F statistic P value is 0.0000002 which denotes that the model is significant.

The optimal linear regression equation under the final "diamond model" is:

$$\ln EXS = 4.65235 - 1.16734 \ln X_1 + 0.80213 \ln X_2 + 0.49953 \ln X_3 + 0.45167 \ln X_5$$  \hspace{1cm} (3)

From formula (3), it manifests that the four factors, employment in the tertiary industry, gross domestic product, export of goods and trade, and openness of China's service trade have a great impact, on the competitiveness of China's service trade.

3. Model analysis

3.1. Human Resources

According to the model, the regression coefficient of employment in the tertiary industry is negative. The empirical results reveal that the surplus of labour is a major obstacle for the improvement of
China's service trade competitiveness. Taking logarithm as a reference value, when the labour force increases by one unit, the competitiveness will drop by 1.16734 units. China's ordinary labour force is now very abundant while skilled people are scarce. In the above formula, the former labour force is in the majority. China's brain drain is more serious. A large number of top talents flow into developed countries such as the United States and Australia or foreign companies with relatively strong competitiveness, which makes China lack of reserve of specialized talents relatively.

3.2. Trade in Goods
As the export of trade in goods increases each additional unit, the competitiveness of China’s service trade increases by 0.49953 units. Taking the high-end service industry as an example, the high-end service industry generally includes the financial service industry, the information service industry, the research and development service industry, the business service industry, the circulation service industry, the cultural and creative industry, etc and their service contents are mutually integrated. Therefore, in the process of sustainable development of trade in service, the reform and innovation of Chinese enterprise service runs through the whole industrial chain from system solutions, design and maintenance, installation and operation, finance, to consulting and so on. The mutual cooperation of related and supporting industries can maximize the advantages of each service industry. When the service trade structure is continuously optimized and the industrial chain is gradually improved, the service efficiency and service quality of the specific service industry will be greatly improved, and the cost will be reduced accordingly.

3.3. Openness to the outside world
From the model equation, it is concluded that expanding the openness of one unit increases the competitiveness of trade in service by 0.45167 units. Therefore, China needs to continue to deepen its opening up and abide by the access principles of the GATS Agreement in order to attract more foreign businessmen to invest directly or indirectly in China. The highly competitive industries of foreign businessmen will form a certain competitive situation with China's service trade, which can promote the continuous optimization of the development strategy and structure of Chinese enterprises, and enterprises can acquire opportunities to learn advanced management concepts and management methods at the same time.

4. The influence of China's Service Trade

4.1. The impact on China's manufacturing sector
With the development of service trade, the service trade has become more economical and professional, which has greatly reduced the cost of manufacturing intermediate products and improved the production efficiency of the manufacturing industry.

By outsourcing some or all services, the manufacturing industry reduces the fixed input of services, integrates more resources and finally forms economies of scale. In fact, with the deepening of the international division of labour, producer services are gradually separated from enterprises. The expansion of demand will enlarge the market, which in turn will attract more employees engaged in trade in productive services. This will eventually become a virtuous circle, so that the manufacturing industry tends to be specialized and large-scale.

4.2. The impact on world trade in services
The “One Belt and One Road” is an international economic and trade cooperation channel proposed by China. As of April 2019, there are 131 countries and 30 international organizations involved. In the development tide of global economic integration and trade liberalization, the problems faced by all countries are universal. Whether in tariff, judicial and economic systems or in logistics in the process of trade flow and in the connection of efficient and fast service systems faced by trade in service, all countries need active and effective cooperation. Under the huge wave of the One Belt and One Road,
because of the difference on the degree of development of service trade in different countries, some countries with weak development may face enormous challenges, but at the same time they will obtain unprecedented opportunities. The world economic system also becomes more diversified because of the injection of the Belt and Road Initiative and the formation of the “Belt and Road” trade industry chain.

5. Countermeasures for the Development of China’s Service Trade

5.1. Improve the level of human resources management
The problem of China's production factors lies in the relative lack of professional talents and the inability to manage and utilize talents reasonably. Regarding the development of the high-end service industry or the further improvement of the competitiveness of the traditional service industry, it is necessary to rely on a large amount of input of talents. Therefore, China should advocate all kinds of talent introduction plans put forward now, and continue to improve the education system, and enterprises should also improve the human resources management system.

5.2. Speeding up the Transformation of Service Industry
At the moment when global tariff barriers and trade protectionism prevail, with the development of the digital economy, the trade of goods, whether in value-added or total trade, has been declining year by year. As a large country in traditional trade in goods, China must accelerate the transformation of the service industry to occupy market. For the traditional transportation and tourism industry, it should be transformed into technology-intensive and capital-intensive enterprises. Enterprises should expand their business scale and enhance their market competitive advantages through strategic alliances, mergers and acquisitions. Besides, government should provide financial support for development and innovation. At the same time, China should follow the trend of The Times reducing the import and export of traditional service trade, and shifting its focus to finance, insurance, taxation, foreign exchange, and other fields.

References
[1] KE, HIAU L, TANG HEIWAI. Domestic Value Added in Exports: Theory and Firm Evidence from China American Economic Review[J]. 2016. 106(6): 1402-1436.
[2] Wang Guanfeng. Research on structural optimization and innovation elements of China's high-end service industry [J]. Enterprise economics, 2008, 37(06): 96-101.
[3] Qiu ailian, cui riming, xu xiaolong. The impact of producer services trade on the improvement of total factor productivity in China's manufacturing industry: mechanism and empirical research -- based on the perspective of value chain economies of scale effect [J]. International trade issues, 2014(06): 71-80.
[4] Yu miaojie. Economic impact and poverty reduction effect of China-asean free trade area [A]. International monetary review, 2018[C]. International monetary research institute, Renmin university of China, 2018: 23.
[5] Zhang Guomin, Zou Liping. Reflections on the construction of "One Belt And One Road" international trade industry chain [EB/OL]. (2015-4-14).