Analysis on Agglomeration Level of the Software and Information Service Industry in Xiamen

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Keywords: Software and Information Industry, Industrial Agglomeration, Location Entropy.

Abstract. By calculating the agglomeration degree of software and information service industry in Xiamen, it is found that the agglomeration degree of software and information technology service industry in Siming and Huli District is high, and the construction of software park and Xiangyu Free Trade Zone has achieved initial results. However, the aggregation degree of Jimei area is low, which indicates that the construction of the third phase of the software park still has great potential, and its role needs to be further improved.

Introduction

Xiamen formulated and issued a series of policies and plans including “Special Plan of “13th Five-year” Development of the Software and Information Service Industry in Xiamen” and “Special Plan for New-generation Information Technology industry in Xiamen” in 2016. Meanwhile, The “leverage” role of capital fund was played to drive the rapid development of the industry. In addition, Xiamen Information Group Co., Ltd. and MIGU jointly established the first two-dimensional development fund of 500 million Yuan in Aug. 2016. Through investment in related two-dimensional industries including cartoon, animation, literature, books, film & TV and games, a batch of high-growth enterprises will be rapidly incubated and cultivated as the leading potential ones in all industries to finally enhance the influence of two-dimensional industry in Xiamen and even across the country. Besides, Xiamen also mobilized social capital powers to participate in equity investment. YLZ Information Technology Co., Ltd. and SHINE SCIENCE & TECHNOLOGY (HOLDINGS) LIMITED announced the establishment of big data R&D fund respectively to be mainly used for healthcare & medical and financial big data R&D.

The development of the software and information industry in Xiamen is benefited from the introduction and cultivation of outstanding talents and “cohesion” of platform establishment. Xiamen Software Park is deemed as the talent adsorber, incubator and accelerator of information industry in the Economic Zone on the West Side of the Straits. The convergence of a large batch of excellent large enterprises in the park brings about huge effect of sheep flock to the internet entrepreneurship in Xiamen. Meanwhile, the innovation capacity of the enterprises in the park is further improved.

Overview of Related Researches

Research on Methods for Measuring Industry Agglomeration

Many scholars at home and abroad have measured the industry agglomeration level by mainly centering on manufacturing industry and producer service industry. Speaking of measurement of agglomeration level of the manufacturing industry, Brulhart and Sbergami (2009) measured the agglomeration level of the manufacturing industry by utilizing space Gini coefficient and cross-border data; the scholars including Baldwin et al (2010), Brunello and Langella (2016) measured agglomeration level of the manufacturing industry in many countries such as Canada and Italy through location entropy respectively. The result manifested that the manufacturing industry in developed countries has high agglomeration level; Xiu-Feng Fan and Xiao-qin Kang (2013) measured the agglomeration level of the manufacturing industry in Shaanxi province through
location entropy and space Gini coefficient; Jian-Hua Cui and Yu-Yu Niu (2015) measured the geographical agglomeration level of the manufacturing industry in the midland; Ru-Yu Zhao and Yi-Ming Hou (2015) measured the agglomeration level of the labor-intensive manufacturing industry in China by utilizing space Gini coefficient. It’s found that it had been at low agglomeration state for a long time. Secondly, speaking of the measurement of agglomeration level of the producer service industry, Mori et al (2005) and Ellison (2007) measured the agglomeration level of the service industry in Japan and America by utilizing EG index respectively. Guillain and Gallo (2007) measured the agglomeration level of the service industry in Paris by using space Gini coefficient. Zheng-Tian (2013) measured the agglomeration level of the service industry in America through location entropy. The research result showed that the agglomeration level of the service industry would facilitate economic growth. Xiao-Peng Hu and Qing-Ke Li (2008) measured the agglomeration level of the producer service industry in some cities in Yangtze River Delta region through location entropy. According to the research result, it’s found that there existed difference in agglomeration models of the producer service industry in the Yangtze River Delta region.

Research on Relationship between Industry Agglomeration and Economic Growth

According to lots of phenomenon and theoretical researches carried out abroad, it’s indicated that the agglomeration of competitive industries facilitated the regional economic growth (Richard et al, 2001; Ottaviao and Pinelli, 2006). There were main two reasons for industry agglomeration facilitated economic growth. Firstly, industry agglomeration made enterprise’s individual traffic and information exchange easier, thus regional innovation was enhanced and regional economic growth was facilitated while the innovation cost was reduced. Martin and Ottaviao (2001) supposed that industry agglomeration made the economic activities among enterprises more frequent and reduced the cost for the enterprise innovation. Richard et al believed that industry agglomeration brought about more obvious spillover effect, thus the regional economic growth was facilitated. Ciccone and Hall (1996) thought that the employment density of the industry agglomeration in American was mainly increased. It’s found that the labor productivity of non-agricultural industries was increased by 6% every time when the employment density was doubled. Cingano and Schivardi (2004), Brulhart and Mathys (2007) believed that the elastic coefficient of the labor productivity of the industry agglomeration region was higher than that of non-industry agglomeration region.

According to the experimental evidence of regional growth in China, it manifested that the industry agglomeration played an apparent role in facilitating regional economy. By carrying out panel data model research, Liang Zhang (2009) found that spatial agglomeration of economic activities of the urban industries in China had remarkable positive influence on economic growth. Wen-Hui Peng (2013) believed that the strong externality of industry agglomeration had significant impact on increasing total factor productivity. Wan-Li Zhang and Wei Wei (2017) supposed that industry agglomeration began having positive influence on on economy. Hao-Ran Hu and Yan-Feng Nie (2018) supposed that the productivity of the development zone was higher from the perspective of industry agglomeration. However, the productivity may fall after rise along with industrial upgrading and economic growth.

Research on Agglomeration Level of the Software and Information Industry in Xiamen

Through analysis of literature at home and abroad, it’s found that the perfect system has already been basically formed for the research on industry agglomeration. The academic circle further could comprehensively and accurately generalize agglomeration phenomenon by measuring the agglomeration level of the industry through various indexes. However, speaking of study region, one country or one large economic region was mostly taken as the research object, but there were few researches by taking one city and its administrative region as the research object. Speaking of the industries studied, there were many researches on manufacturing industry and producer service industry, but there were few ones by taking single industry as the research object. Up to the present, there also has been no researches on agglomeration of the software and information industry in Xiamen. Only Hui-Yun Zhong and Qi-You Guo (2015) analyzed the agglomeration status of the producer service industry in 9 prefecture-level cities in Fujian province through location entropy.
The research manifested that the agglomeration advantages of the producer service industry in Fujian province is being or has been formed. However, there’s imbalance in geographical space distribution. Based on the previous researches, the agglomeration level of administrative regions and the degree of its facilitation of regional economic growth was measured by taking the software and information industry in Xiamen as the research object in this subject, based on which, the municipal-level model of agglomeration influence factors of the software and information industry was built. Based on empirical result, related policy suggestions were proposed to facilitate agglomeration of the software and information industry in Xiamen microscopically and macroscopically and further facilitate economic growth by relying on industry agglomeration.

**Measurement of the Agglomeration Level of the Software and Information Industry in Xiamen**

The service industry has already become the main engine facilitating the economic growth of Xiamen. In particularity, its contribution rate of economic growth reached 69.1% in 2016. However, it has prominent role in tax revenue and absorption. The pace of the development of all industries has been expedited, in which the competitiveness of the software and information industry is improved. The operating revenue of 29.71 billion Yuan was realized in the service industry of information transmission, software and information technology in 2016, an increase of 26.8%. Under the drive of “Internet+”, rapid progress in software development, cartoon game and third party platform has been made. Meanwhile, G-bits and Meitu Mobile has been listed, and BNB has been listed among top 100 enterprises in China in terms of software business revenue. Besides, 4399 Network, Quyou Time and GreeNet have been listed among 100 internet enterprises in China.

The agglomeration level of the software and information technology service industry in 6 districts of Xiamen was measured through location entropy in this paper. The basic principle of location entropy had been introduced before. Related indexes of the industry in the paper were calculated according to total tax amount. Compared to other indexes including the number of employees, the enterprise’s tax amount could directly manifest the enterprise’s profit level and the industrial development degree of one region.

<table>
<thead>
<tr>
<th></th>
<th>Siming</th>
<th>Huli</th>
<th>Haicang</th>
<th>Jimei</th>
<th>Tong’an</th>
<th>Xiang’an</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>1.862459</td>
<td>2.006833</td>
<td>0.037786</td>
<td>0.103394</td>
<td>0.0333</td>
<td>0.04214</td>
</tr>
<tr>
<td>2015</td>
<td>1.320564</td>
<td>3.630808</td>
<td>0.076318</td>
<td>0.829691</td>
<td>0.047675</td>
<td>0.022175</td>
</tr>
<tr>
<td>2016</td>
<td>1.748905</td>
<td>2.368759</td>
<td>0.10966</td>
<td>0.31632</td>
<td>0.073268</td>
<td>0.026278</td>
</tr>
</tbody>
</table>

It could be found from the table 1 that the agglomeration level of the software and information technology service industry in districts Siming and Huli was high from 2014 to 2016. Especially, it was higher in Huli district. It thus could be found that initial success in construction of Xiamen Software Park and Xiangyu Pilot Free Trade Zone has been made. Particularly, the State Council decided to establish China (Fujian) Pilot Free Trade Zone on December 12 2014. China (Fujian) Pilot Free Trade Zone includes Fuzhou, Xiamen and Pingtan, in which Xiamen has a floor area of 43.79 sq.km. The location entropy value of the software and information technology service industry in Huli district in 2015 reached 3.63, but that in Siming district reached 1.32, which indicated that the Xiamen Software Park Phase I and II and Xiangyu Pilot Free Trade Zone absorbed the enterprises in the software and information industry to a great extent. However, the location entropy value of the software and information technology service industry in districts Jimei, Tong’an and Xiang’an from 2014 to 2016 was smaller than 1, which indicated there will still be huge potential in the construction of Xiamen Software Park Phase III, whose role will be further improved.
Policy Suggestions

The industry agglomeration will generate two scale effects. Firstly, speaking of internal scale effect, it mainly indicates the change in cost is brought by the scale effect that is formed along with the input of various production factors in individual enterprise. Secondly, speaking of external scale effect, it indicates that the expansion of the development scale of the whole industry brings about the change in cost of the individual enterprise in the industry. When the combined effect of two effects is positive, it will be called agglomeration economy if the cost will be reduced or extraneous income is obtained, e.g. reduction in fixed cost and increase in skilled labor forces. It is usually at the stage of increasing returns to scale.

The Government Shall Give All-round Support in Planning the Industry Agglomeration

The government should be clear about its role positioning. It cannot make choice on behalf of the enterprise but give proper instructions to the enterprises during market configuration. A lot should be input into the software and information technology industry at the research and development stage, so the government should play a key role under the situation of weak infrastructure at initial stage and gradually build industrial generic technology research and independent innovation system. While the system is improved, the government shall gradually abandon the dominate position but pay attentions to auxiliary functions such as policy formulation, environmental construction, financial support and public service. As far as corporate credit is concerned, the government shall encourage financial institutions to take practical measures including opening green loan channel and reducing threshold to attract more enterprises to participate in the development of the software and information technology industry.

Further Enhance Platform Building and Carry Forward Coordinated Development of the Industry

Along with the rapid development of burgeoning information technologies represented by cloud computing, big data and mobile, the pace of shifting the information technology service industry from traditional PC times to the burgeoning technologies has been initially expedited. While concentrating on their advantageous fields, the enterprises need to support the business development by combining burgeoning technologies. Thus, the cooperation becomes the main trend of the industry. Meanwhile, the competition of the information technology industry is being evolved into the whole industry chain competition of synergistic effect of aggregated ecosphere from individual enterprise’s competition. In consequence, the government should encourage and support the enterprises to open the platform and build their ecosphere to facilitate the construction of ecosphere. In this way, it will be favorable for creating industrial innovation and entrepreneurial environment with high efficiency and low cost.
Strengthen Information Security Construction

In comparison to informationization of the consumption field, that of the industrial field further approaches the enterprise’s business secret. If the information is stolen, the consequence may be more severe, and even serious consequence may be brought to the national security. Therefore, the problem about information security becomes a prominent one to be solved on the road of informationization. In a bid to solve the problem, besides strengthening the legislative characteristics of Xiamen as a sub-provincial city and intensifying the construction of related laws, regulations and systems of big data & information security, the government should build open data, management and information security guarantee system giving considerations into the security and efficiency.

Conclusions and Research Expectations

According to the calculation result of the location entropy value in the second part, the agglomeration level of the software and information technology industry in the districts Huli and Siming is very high. The formation of industry agglomeration can be facilitated subsequently on this basis, the reason for which is that the development of all modern service industries features harmony. The development of the software and information technology industry can help lay solid foundation for the development of transportation, financial industry, real estate, leasing and commercial service industry, scientific research, technology service, geological prospecting industry, water resource & environment, education, hygiene & social security, and cultural industry.

Speaking of districts including Haicang, Jimei, Tong’an and Xiang’an, the advanced experience in development of the districts Huli and Siming can be referred to. By relying on the unique characteristic that there is no requirement for natural resource for the software and information technology service industry, the government should strive for developing the software and information technology service industry and facilitating the formation its industry agglomeration to expedite the development of the modern service industry in these districts and finally carry forward the adjustment of economic structure and supply-side reform.

The employee data of the software service industry and the number of employees in each district should be provided in the future research to calculate the location Gini coefficient of the software and information technology service industry.

Simultaneously, the agglomeration level of modern service industry in Xiamen should be studied to determine the industry agglomeration and technical efficiency of modern service industry in Xiamen by collecting relevant data such as transportation, warehousing & postal service industry, information transmission, financial industry, real estate, leasing & commercial service industry, scientific research, technology service & geological prospecting industry, water resource, environment and public facility management, education, hygiene, social security and social welfare, culture, education and entertainment industry.

References


