

Spatial Agglomeration of Exhibition Enterprises on a Regional Scale in China

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Abstract: During the past two decades, the exhibition industry in China has been developing rapidly and has become an important part of the modern service industry, particularly the agglomeration characteristics of exhibition enterprises highlighted on the regional scale. Although the development of theoretical research on the western exhibition industry has taken place over time, the spatial perspective has not been at the centre of attention so far. This paper aims to fill this gap and report on the agglomeration characteristics of exhibition enterprises and their influential factors. Based on data about exhibition enterprises in the Pearl River Delta (PRD) during 1991–2013, using the Ripley K function analysis and kernel density estimation, this research identifies that: 1) the exhibition enterprise on the regional scale is significantly characterized by spatial agglomeration, and the agglomeration density and scale are continuously increasing; 2) the spatial pattern of agglomeration has developed from a single-center to multi-center form. Meanwhile, this paper profiles the factors influencing the spatial agglomeration of exhibition enterprises by selecting the panel data of nine cities in the PRD in 1999, 2002, 2006 and 2013. The results show that market capacity, urban informatization level and exhibition venues significantly influence the location choice of exhibition enterprises. Among them, the market capacity is a variable that exerts a far greater impact than other factors do.

Keywords: exhibition enterprises; spatial agglomeration; Ripley K function analysis; regional scale; Pearl River Delta

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1 Introduction

Global economic trends have changed from an ‘industrial-based economy’ to a ‘service-oriented economy’ since the 1970s. With the rapid growth of the service industries, the spatial agglomeration tendency is becoming increasingly apparent, and more and more theoretical analysis frameworks regarding industrial agglomeration have been utilized in researching the service industries (Hong *et al.*, 2014; Ke *et al.*, 2014; Li *et al.*, 2015; Valentina and Maria, 2015). Because each internal sector of the service industry has a different

focus on choosing location factors, the industry presents a wide variation in spatial distribution patterns, such that it is not enough to study the distribution of the industry as a whole. Rather, since the 1990s, studies on the spatial distribution of the internal sectors of the service industry have gradually been increasing (Coffey *et al.*, 1996; Chan *et al.*, 2012; Blanca *et al.*, 2012; Lee and Hwang, 2014; Wouter *et al.*, 2014).

As an important component of modern service industries, the exhibition sector has gained more attention. Academic studies on the exhibition sector have taken place in the West over time, but the studies from a spa-

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tial agglomeration perspective are limited, and scholars mainly regard the exhibition as a temporary cluster in their research. It is argued that international trade fairs can be viewed as temporary clusters that support processes of interactive learning, knowledge creation and the formation of international networks (Bathelt and Schuldt, 2008). Although studies on temporary clusters involve many issues, most research focuses mainly on the role of international exhibitions in the knowledge exchange. Some scholars argue that temporary clusters play an important role in establishing transnational linkages or 'pipelines' between local and global firms, the variety of planned and unplanned meetings, and the rich ecology of information flows and different forms of interaction create 'global buzz' (Bathelt and Schuldt, 2008; Bathelt and Turi, 2011; Schuldt and Bathelt, 2011; Ramirez-Pasillas, 2011; Bathelt and Zeng, 2014; Li, 2014; Bathelt and Gibson, 2015). Rinallo and Golfetto (2011) also found that exchanges of knowledge do not always occur at the global level. Instead, the geographic scale of the processes of exchanging and acquiring knowledge in temporary clusters is constructed at several levels: from the merely local to the truly global. Meanwhile, some scholars have explored the location choice of temporary agglomerations, and noted that international expositions usually choose to locate in globally famous cities with high levels of accessibility through convenient transportation (Bathelt, 2012; Bathelt and Spigel, 2012).

The exhibition industry started late in China but has been developing rapidly in the past two decades. The agglomeration characteristics of China's exhibition enterprises highlight on the regional scale. At present, five concentration areas have been formed: the Pearl River Delta (PRD), the Yangtze River Delta, the Bohai Rim Region, the Northeast Region, and the Midwest region. From the spatial perspective, increasing research attention mainly involves two perspectives: the spatial layout of the exhibition industry nationwide, and the spatial agglomeration of the exhibition industry in a specific area. Research on the spatial arrangement shows that the exhibition sector is uneven in regional development in China (Yang and Jin, 2014), and to some extent there is a concentration in the spatial distribution, but the level of agglomeration is low (Dai and Chen, 2010; Li and Yu, 2011). At the same time, the spatial distribution, income structure and the scale structure of the exhibition

venue are also unbalanced (Ju and Tian, 2006). The level of economic development is the most important factor influencing the spatial layout of exhibitions (Zhu, 2004). Other traditional influential factors, such as natural conditions and natural resources, are on the decline, while the influence of information technology and innovation are on the rise (Ju and Tian, 2006). As the trend toward agglomeration in the main cities becomes clearer, more researchers attach more importance to the spatial patterns of the exhibition sector in specific areas. Fang and Guo (2013) argued that exhibition enterprises in urban areas are characterized by notable spatial patterns that are saliently affected by exhibition service facilities, the overall business environment, external economies, government behavior and human resources. Ren (2014) believed that the city status, trade and exhibition economy, industrial policy, transportation, geographical location and mega events are the main driving factors behind the spatial layout of exhibition venues.

The above research has sparked interest in academic circles about the spatial agglomeration of the exhibition sector. However, there are obvious limitations. First, this research is based on the premise that exhibition enterprises are characterized by spatial agglomeration, and the exhibition industry cluster is viewed as an objective fact; however, no empirical studies show that the exhibition industry is significantly agglomerated and clustered at the regional scale. Secondly, there is a focus of research on the spatial layout of the exhibition industry at the macro scale, and a lack of research on the spatial agglomeration at the regional scale. However, the agglomeration characteristics and formation mechanisms of the exhibition industry may be different at different spatial scales.

Taking the PRD as the case, we discuss the agglomeration characteristics of exhibition enterprises and their influencing factors. Since China's economic reforms, the exhibition industry has been developing rapidly in the PRD, and China has become a representative concentration area of exhibition industry. Based on data from the PRD and using Ripley K function analysis and panel data model, we consider two primary issues. The first is whether exhibition enterprises are significantly characterized by spatial agglomeration on a regional scale and what are the agglomeration characteristics and their most influential factors. Second, we seek to identify what the similarities or differences are between the

urban scale and the regional scale when it comes to the agglomeration characteristics and influencing factors. These researches contribute to understanding the theoretical system of economic geography and industrial agglomeration. The conclusion provides a conceptual basis for clustering the exhibition sector and has practical implications for policy development and exhibition sector competitiveness.

2 Data and Methods

2.1 Data

Exhibition enterprises in this paper include professional exhibition companies, exhibition venues and exhibition service enterprises. The data about exhibition enterprises are taken mainly from a business directory compiled by the Statistics Bureau of Guangdong Province. Listings include company names, addresses, zip codes, nature, year established, business scope, enterprise scale and so on. Some 2116 exhibition enterprises were selected for analysis. We regard each enterprise as a spatial point and locate it on Google Earth. Next, the point was matched with the PRD electronic map. Finally, according to when each enterprise was established, a spatial distribution map was developed for 1991, 2002 and 2013 to provide a visual summary. The data used for panel data model in this paper came mainly from the Industrial and Commercial Administration Bureau and the Guangdong Statistical Yearbook. Data processing was completed by EVIEWS 6.0.

2.2 Methods

2.2.1 Ripley K function analysis

The Ripley K function is commonly used in point pattern analysis. We regard each exhibition enterprise as a point on the plane, with each point on the map being a point coordinates. We then analyze the spatial distribution pattern of the exhibition enterprises, namely, the point pattern. The K function is defined as formula (1):

$$K(d) = A \sum_{i=1}^n \sum_{j=1}^n \frac{\delta_{ij}(d)}{n^2} \quad (1)$$

$$i, j = 1, 2, \dots, n; i \neq j, d_{ij} \leq d, \delta_{ij}(d) = \begin{cases} 1 & (d_{ij} \leq d) \\ 0 & (d_{ij} > d) \end{cases}$$

$$L(d) = \sqrt{\frac{K(d)}{\pi}} - d \quad (2)$$

where A is the area of the study region; n is the number of exhibition enterprises; d is the Euclidean distance; d_{ij} is the distance between enterprise i and enterprise j ; and $\delta_{ij}(d)$ is the weight between point i and point j , it equals 1 when the distance between point i and point j is less than or equal to d , otherwise it equals 0. Besag (1977) proposed replacing $K(d)$ with $L(d)$, making a linear transformation of the square root in order to maintain variance stability. Under the assumption of random distribution, the expected value of $L(d)$ is 0. The distribution pattern of the exhibition enterprises which depends on the scale d can be verified by diagramming the relationship between $L(d)$ and d . $L(d) > 0$ represents aggregate distribution; $L(d) < 0$ represents uniform distribution; and $L(d) = 0$ represents the random distribution. The confidence interval of $L(d)$ can be calculated with the Monte Carlo. When the distribution pattern is an aggregate distribution, the information of agglomerate intensity and scale are available according to the above diagram. At this time, the maximum deviation from the confidence interval, i.e., the first peak of $L(d)$, can be used to measure the intensity of aggregation, while d corresponds to the first peak value of $L(d)$ which indicates the characteristics of the spatial scale of aggregation. The d can be used to measure the agglomeration scale.

2.2.2 Kernel density estimation

Kernel density estimation is a method of studying the data distribution characteristics from the data sample itself and is suited to represent spatial point patterns by using visualization methods. It is used to study distribution characteristics by investigating the spatial change of point density in regular areas. As a result, it can be used to identify and indicate sample agglomeration and dispersion status in the area studied (Berke, 2004). With the help of ArcGIS10.1, we adopted the kernel density function put forward by Silverman (1986) to analyze the spatial distribution pattern of exhibition enterprises in the PRD.

2.2.3 Panel data model

(1) Variables

Considering the availability of statistical data to measure the exhibition industry, we use the quantity per unit area of the exhibition enterprises, namely, the density per unit area, to measure the degree of agglomeration of the exhibition enterprises, represented by the QUA.

With reference to existing empirical research results on the spatial concentration of the service industries (Chen *et al.*, 2009; Ren *et al.*, 2011; Jin *et al.*, 2012; Ke *et al.*, 2014; Valentina and Maria, 2015) and the characteristics of the exhibition sector, we assume that economies of scale, knowledge spillover, market capacity, the degree of economic growth/openness, labor costs and informatization level will exert an impact upon the location of enterprises. A specific explanation of the above variables follows:

① Exhibition venues: venues are the engine for developing the exhibition industry. In particular, the size of the exhibition venue is a critical factor. Related research shows that the exhibition enterprise tends to choose a location close to exhibition venues (Fang, 2013). This study uses the venues' area to measure the index of exhibition venues as represented by the AREA.

② Knowledge spillover: the production and consumption process of the modern service industry is related to high tech development, so there is a large amount of assimilated explicit and implicit knowledge. The spatial proximity of similar or complementary service industries will improve the efficiency of knowledge dissemination, promote enterprise innovation and improve an organization's competitive edge. The measurement of knowledge spillover has become a key issue in this field. Substitute indexes consist of the knowledge output index (the number of patents and innovation) or input index (R & D funds, the number of people engaged in R & D, *etc.*) (Chen *et al.*, 2009; Ren *et al.*, 2011). We selected the internal expenditures of R & D institutions as a share of GDP to measure knowledge spillover, represented by RDG.

③ Market capacity: enterprises tend to be located in areas that possess greater market capacity and which depend on the level of regional economic development. The higher the level of economic development, the greater the effective demand will have on the market. Furthermore, given the more developed the trade, the greater the demand will be for an exhibition. In this paper, GDP per capita is used to measure the market capacity, represented by PGDP.

④ Economic openness: enterprises usually choose to locate in areas that have greater economy openness. Larger openness means that the upward mobility of production in the region is strong, which can significantly reduce the cost and increase the efficiency of location

allocations. Jin *et al.* (2006) used the ratio of imports and exports as a share of GDP to the corresponding national average to measure relative economic growth. We adopt the ratio of total export-import volume to GDP to measure the degree of economic openness and growth, represented by EXP.

⑤ Labor costs: labor costs primarily reflect the level of human capital and supply. Labor-intensive enterprises often choose to invest in low-wage regions, while technology-intensive companies are more inclined to invest where high wages are common due to their need for a higher-quality workforce. We use the average wage of workers to measure labor costs, represented by AWAGE.

⑥ Informatization level: Quah (2001) believes that the development of information technology creates a situation where enterprise employees do not need to gather in one place. This leads to a gradual growth of decentralized workforces, with the enterprises become more dispersed. But some scholars believe, conversely, that the development of information technology actually promotes spatial concentration (Jed, 1999). The evaluation indicators of informatization include postal services, telecommunications and the internet. We use the postal service and telecommunications output proportion of GDP to measure the informatization level, represented by NET.

(2) Model

The statistical data from the exhibition industry are not incomplete. Therefore, we selected the panel data from nine cities in the PRD in 1999, 2002, 2006 and 2013 to analyze the spatial agglomeration of exhibition enterprises. At these points in time, the data are both complete and meet the requirements of a certain time interval.

We used the panel data model to analyze the influential factors of spatial agglomeration of the exhibition enterprises in the PRD. There are several reasons for the use of this model. First, the panel data contain time series data and cross-section data, so it can be used to analyze the static difference between regional indicators, while also describing the dynamic variation characteristics of each regional index itself. Second, panel data can effectively expand the sample size, improving the estimation accuracy of the model. Since the statistical work of the exhibition industry in China is relatively limited, this paper is not able to analyze data for a longer period

in order to build a model. If the time-series data from a shorter period were adopted, the sample size would be insufficient. The panel data, therefore, can solve the problem of insufficient sample size due to a shorter observation period and lower model estimation accuracy by expanding the data of the same period several times. Third, the use of a panel data model can reflect the comprehensive impacts of time and individual differences neglected.

Because the model only analyzes the individual differences of the sample itself, it is considered a fixed effect model. However, the time sequence is shorter and as a result, the model can not be judged as to whether it is a hybrid model, variable intercept model or varying coefficient model with the help of the formula. Therefore, we tried to calculate variable intercept fixed effects, variable intercept random effects, variable coefficient fixed effects and variable coefficient random effects.

3 Agglomeration Characteristics of Exhibition Enterprises

3.1 Agglomeration is obvious with increasing intensity and scale

To test whether the exhibition enterprises are significantly characterized by spatial agglomeration in the PRD, based on the software Crime stat, we analyze the Ripley K function of 2116 exhibition enterprises in 1991, 2002 and 2013. The results indicate that the degree of agglomeration of exhibition enterprises in each time frame is higher than the maximum value of the random distribution (Fig. 1). The tests of the significance for all indexes are passed, which indicates that, in a specific spatial scale, exhibition enterprises are significantly characterized by spatial agglomeration in the PRD.

According to the changes during each time period, in 1991, the characteristic spatial scale of the agglomeration was 6.5 km. The concentration intensity gradually increased with increasing distance in the range of less than 6.5 km; when that range was more than 6.5 km, the intensity gradually decreased but was still highly agglomerated. The corresponding $L(d)$ peak value (concentration intensity) was 27; in 2002, the characteristic spatial scale increased to 13.3 km, and the corresponding $L(d)$ value jumped to 60. In 2013, the spatial scale and the corresponding $L(d)$ value were 18 and 91 re-

spectively. Overall, across the 20-year span, the spatial concentration intensity of exhibition enterprises in PRD has gradually increased, and the scope of spatial distribution has gradually expanded. This phenomenon indicates that with the development of the exhibition industry, the scope of the location choice of exhibition enterprises is expanding. At the same time, the degree of spatial agglomeration has not diminished because of the expansion of the scope, but the coexistence of diffusion and agglomeration. The characteristics of the coexistence are consistent with the general characteristics of producer services agglomeration.

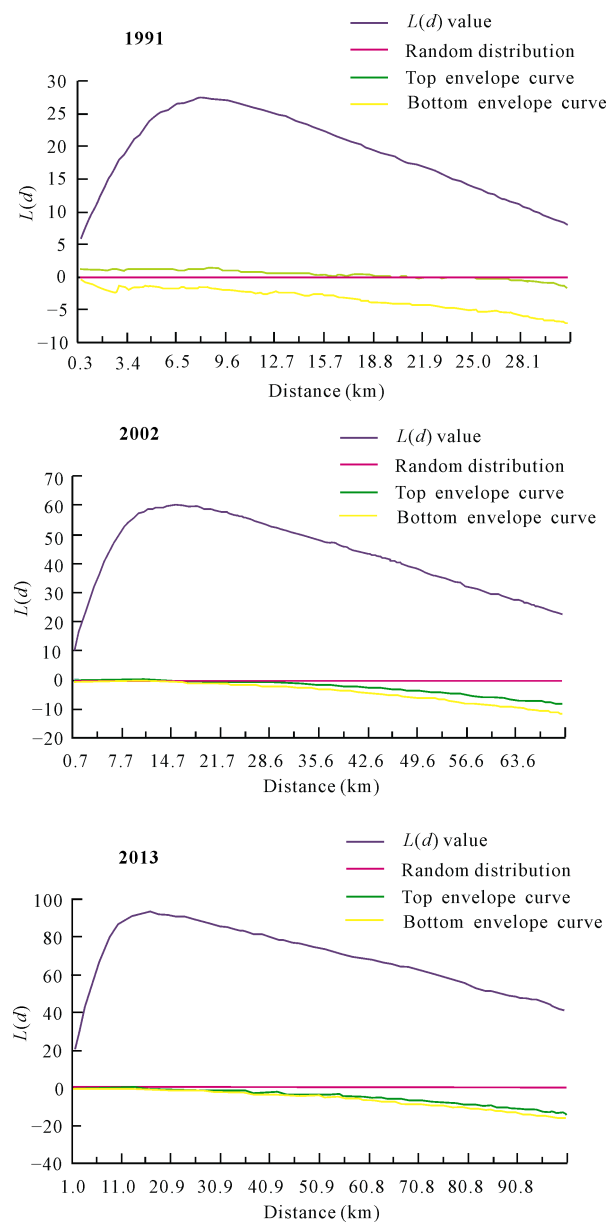


Fig. 1 Ripley $L(d)$ index analysis of different stages

3.2 Agglomeration pattern of single-center to multi-center

New reforms on professionalizing the exhibition industry in 1991 led to enormous strides to develop the exhibition industry in the PRD. In particular, the Guangzhou International Convention and Exhibition Center was established in 2003, which exerted a tremendous impact upon the evolution of exhibition enterprises in the region. From that starting point, we analyze the changes of the spatial distribution of the 2116 exhibition enterprises during the three years noted earlier.

We analyzed the spatial distribution of the exhibition enterprises by kernel density estimation (Fig. 2). As seen in Fig. 2, the spatial distribution has obvious nodes of concentration. There has clearly been an evolution from a single-center agglomeration in Guangzhou in 1991 to one of multiple centers in 2013. In 1991, the distribution was clustered mainly in Guangzhou, with a small distribution in Shenzhen. By 2002, the agglomeration in Shenzhen had increased substantially, and both Shenzhen and Guangzhou were highly clustered, with small concentrations in Dongguan and Foshan. In 2013, however, the scope of distribution had widened yet again. Besides Guangzhou and Shenzhen, the number of exhibition enterprises in Dongguan, Foshan and Zhongshan had grown significantly. Thus, evolution of the spatial pattern of exhibition enterprises in the PRD can be divided into three stages:

(1) Single-center stage: where exhibition enterprises were concentrated largely in Guangzhou (before 1991). Guangzhou is the earliest city to have developed an exhibition industry in China, and it is also where the first Chinese exhibition, the ‘Canton Fair’, was held. During this period, Guangzhou built the Liuhua Exhibition Venue (1974) and Guangdong International Trade Building Exhibition Center (1990). As for exhibitions, in addition to the annual Spring and Autumn Canton Fair, Guangzhou also hosted the International Beauty Supplies Import and Export Fair (1989) and the International Plastics and Rubber Industry Exhibition (1987). Driven by the Canton Fair, there were 52 exhibition enterprises located in Guangzhou in 1991, accounting for 73% of the total exhibition enterprises in the PRD and for the single-center spatial pattern concentrated in Guangzhou. Concurrently, the Shenzhen exhibition industry was also experiencing a certain degree of development, in large part due to the construction of the

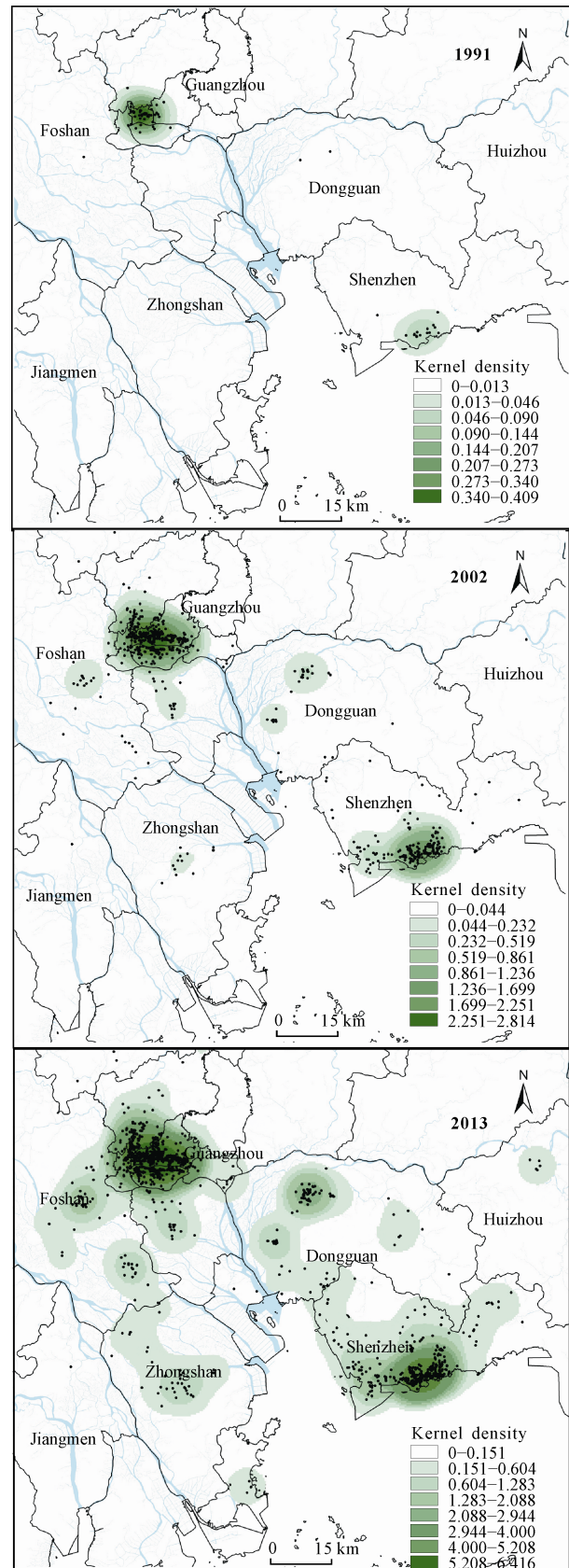


Fig. 2 Kernel density estimation for exhibition enterprises in 1991, 2002 and 2013

Shenzhen Industrial Exhibition Hall (1985) and the occurrence of the China International Watch & Jewelry Gift Fair (1988).

(2) Double-center stage: where exhibition enterprises were highly concentrated in Guangzhou and Shenzhen (1992–2002). During this period, the Dongbao Exhibition Center (1998), Jinhan Exhibition Center (2002) and other exhibition venues were built in Guangzhou. In terms of events, the China International Building Decoration Fair (1999) and the Guangzhou Gifts Exhibition (2000) were held as well, which led to the further development of the exhibition industry in Guangzhou. In 2002, there were 492 exhibition enterprises in Guangzhou, accounting for 57.75% of the entire PRD. Meanwhile, the China Hi-Tech Fair Exhibition Center was built in Shenzhen (1999) and hosted the Hi-Tech Fair the same year it was built. This spurred the rapid development of the exhibition industry in Shenzhen. The sprawling Hi-Tech Fair Exhibition Center has created a platform for the rapid development of the exhibition sector in Shenzhen. Eighteen exhibitions were held in this center when it was first put into use, and 62 events were held in 2002.

The Hi-Tech Fair also drove the development of other exhibitions. In 1999 there were only 45 exhibitions and Shenzhen's exhibition space totaled 150 000 m². But by 2002, the number had climbed to 90 events and a total exhibition space of 700 000 m². By this time, the exhibition scale and number ranked fourth in the country after Shanghai, Beijing and Guangzhou. Moreover, the number of exhibition enterprises in Shenzhen increased rapidly from 16 in 1991 to 268 in 2002, accounting for 31.45% of the total exhibition enterprises in the PRD, establishing the dual-clustered pattern noted in Fig. 2. In addition, Dongguan, Foshan, Zhongshan and Zhuhai, as well as other cities, also erected new exhibition spaces during the same time and, taken together, they held a variety of exhibitions which resulted in the growth of exhibition enterprises in these areas.

(3) Multi-center stage: where exhibition enterprises were highly concentrated in several cities (2003–2013). This period proved to be the most rapid phase of development of the exhibition industry in the PRD; Guangzhou, Shenzhen, Dongguan, Zhongshan, Zhuhai, Foshan, Jiangmen and Huizhou all were positioned to vigorously develop their exhibition industries. A variety of modern exhibition halls were built and various pro-

fessional exhibitions were held. The exhibition industries of Guangzhou and Shenzhen experienced further rapid development with the establishment of the Guangzhou International Exhibition Center and the Shenzhen Convention and Exhibition Center (2004). Following Guangzhou and Shenzhen, Dongguan became a new concentrated area of exhibitions largely because of its advantages in manufacturing. At the same time, Foshan and Zhongshan were also showing a trend in spatial concentration. In 2013, the number of exhibition enterprises in Guangzhou, Shenzhen, Dongguan and Foshan was 1005, 503, 275 and 142 respectively, accounting for 47.49%, 23.77%, 13.10% and 6.71% of the total exhibition enterprises in the PRD. This growth has given shape to the multi-center agglomeration pattern noted earlier.

Overall, the spatial pattern of exhibition enterprises in the PRD has shown significant change. Growth is fast and the diffusion range is widening, especially spreading rapidly in the PRD over the past decade. This would indicate that the development of the PRD's exhibition industry has been sustained on a large scale.

4 Influential Factors of Exhibition Enterprises

By comparing different models, the results show that regression results of the variable intercept fixed effects model are best. The regression results after taking the logarithm of the variable are shown in Table 1.

From Table 1, we can see that the degree of model fit is relatively high, *F*-test values are lower, and the *T* value of each explanatory variable is higher as well. Therefore, all significance tests of variables are qualified. The DW value indicates that there is no serial correlation. From the perspective of econometric tests, the regression effect is ideal.

The regression results show that the market capacity, informatization level and exhibition venues all have significant impacts on the location choice of exhibition enterprises, while the effects of the other four factors are not significant. Among these factors, the most influential factor is the market capacity; when the market capacity adds 1 percent point, 1.0144 percent points will be added to exhibition enterprises. The second factor of influence is the informatization level; when adding 1 percent point, 0.3116 percent points will be added to the

Table 1 Estimation results of panel data model

Variable	Coefficient	t-Statistic	Prob.
C	-10.2327	-12.3210	0.0000
AREA	0.2469	6.5963	0.0000
PGDP	1.0144	9.8287	0.0000
NET	0.3116	2.2626	0.0330
Fixed effects (cross)			
GUANGZHOU (C)	1.8502	ZHONGSHAN (C)	-0.2003
SHENZHEN (C)	1.2354	HUIZHOU (C)	-0.5885
ZHUHAI (C)	-1.1857	JIANGMEN (C)	-0.9629
FUSHAN (C)	0.0412	ZHAOQING (C)	-0.4839
DONGGUAN (C)	0.2945		
R^2	0.9883	F-statistic (Prob.)	185.5451 (0.0000)
Durbin-Watson stat	2.0944		

Note: C in bracket means constant

exhibition enterprise. A third factor is the exhibition venue, when adding 1 percent point, 0.2469 percent points will be added to the exhibition enterprise. Therefore, the effect of market capacity is far greater than that of other factors. From the view of the spatial agglomeration characteristics and the development process of the spatial pattern of exhibition enterprises in the Pearl River Delta, market capacity (level of economic development) is the decisive factor. The greater the market capacity is, the higher the level of exhibition enterprise concentration will be. At the same time, market demand may lead to the construction of the exhibition hall, which further attracts additional enterprises. Compared to earlier exhibitions, the purpose of exhibitors is to obtain business information rather than trade. Therefore, informatization level is conducive to the development of the exhibition industry, especially in the information age, the higher the informatization level of the cities, the more they will be seen as attractive destinations for exhibition companies.

The impact of knowledge spillover on the choice of exhibition enterprise location is not immediately obvious. One possible reason for this is that when these organizations choose to locate in a city that has a higher informatization level, this will make it easier to obtain relevant information and, to a certain extent, will lessen the role of the knowledge spillover. The requirements of the exhibition industry on the labor quality are relatively low, so that companies do not need to increase their labor costs much to recruit high-quality talent. This may explain why the impact of labor costs is not significant. In addition, due to the fact that the PRD belongs to the

Guangdong provincial administrative region, and each of these regions has the same growth policies, the impact of the level of economic openness is insignificant.

5 Conclusions

Spatial research on the exhibition industry has obvious limitations. Based on our dataset of exhibition enterprises, using the Ripley K function, kernel density estimation and panel data model, we explored the clustering characteristics of exhibition enterprises and the factors influencing these agglomeration patterns. The results can serve as an important reference for developing policies for the exhibition industry, and to enrich the literature on service industrial agglomeration. A summary of the results follows.

Viewed from a regional perspective, the research indicates that exhibition enterprises are significantly characterized by spatial concentrations, and the intensity and scale of clustering have increased, particularly as our case illustrates in the Pearl River Delta. As well, the spatial pattern has developed from a single-center agglomeration initially to multi-center network in recent years. Compared to the urban context, the agglomeration characteristics of the exhibition sector shows significant similarities in that the spatial concentration is increasingly obvious; agglomeration and diffusion co-exist; and the evolution of the clusters have gone from a single-center to multi-center nodes.

As for the influence of variables such as market capacity, urban informatization level, and the presence of high-quality exhibition venues, all of these appear to

exert a significant influence on the location choice of an exhibition enterprise. Among them, market capacity exerts a far greater influence than other factors do. There is also a clear difference in the variables affecting spatial clustering depending on whether the focus is single urban or regional. For example, the most influential factors in the urban context are size of exhibition hall, traffic conditions, public service facilities, business atmosphere, and convenience for major customers. This difference indicates that the spatial scale influences exhibition organizations' location choices.

Major considerations of the spatial structure of services in the West argue that the core characteristic of spatial distribution is spatial concentration, and that the concentration of producer services nearly always shows two structural modes: single-point and multi-nodal modes. The spatial concentration, diffusion, and reconcentration of services promote a structural evolution from a single core to multi-nodal area. As this research demonstrates, the exhibition industry manifests the typical characteristics of the services sector, and its spatial agglomeration characteristics are in accordance with the spatial patterns of services in the West.

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