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Progress and Trends of Spatial Clustering Research in Producer Services

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Abstract: With the low-end industries continuous migration to low-income countries, China has the high requirement to upgrade the level of productive services. This research discussed the spatial aggregation of global producer services from three major aspects, research history, levels and conclusions. and explored the following characteristics: the research perspective shifts from the spatial characteristics of geography-based summaries to the multi-factors of industrial economy, society, and enterprise management. The research level is based on macro research, and gradually moves toward medium and onlookers to better guide urban construction; research conclusions are distributed from static spatial distribution to the dynamic analysis causes of industrial decision-making. In the future, under the support of informatization and big data, the research on the spatial aggregation of productive service industry will inevitably shift from the analysis of historical spatial characteristics to the analysis of corporate spatial decision-making in the context of analyzing social and economic development trends. The development path can better guide the dynamic development of the space gathering of the industry in the future by considering Chinese characteristics.

1. Introduction

For most developing countries, traditional manufacturing industries such as light industry and heavy industry are still important drivers of economic development. However, the proportion of the tertiary industry in developed countries is more than 60% (the United States accounts for 74.5%), while the producer service industry such as occupational insurance, real estate, information consulting, scientific research and comprehensive services accounted for 71.55% of the tertiary industry's total output value, and the employment accounted for 72.57%. The producer service industry (Producer Services) has played a very important role in the tertiary industry. As China's low-end manufacturing industries continue to move to low-income countries such as Southeast Asia, China is facing an increase in the level of productive service industry. This has become one of the key factors that span the middle-income trap, which leads to the inevitable research on the spatial clustering of productive services to become one of the research priorities of urban construction in the future.

2. Research and development history

The research on spatial clustering of early productive service industry is not a specific targeted research, but a study of the functional structure and morphology of the entire city or urban center, with some layout features reflecting the spatial clustering of the productive service industry. The Chicago



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School summed up the urban layout characteristics of commercial office buildings from urban land to form and space layout. Its representative - Ernest Burgess proposed concentric circle theory in 1925 (Homer Hoyt sector and wedge pattern), CD Harris and E.L. Ullman continue to develop multi-core models. The research on spatial clustering of domestic producer services begins with the development of Shanghai Pudong, Shanghai Planning and Design Institute. In 1986, the construction of Lujiazui CBD was first proposed as a starting point. Later, it was studied by Xiao Xiaopei (1993), Sun Yifei (1994) and Li Xueyan (2002). However, these studies focus on the analysis of CBD land use, and the development of specific urban CBD functions and structural adjustment. The goals, ideas, and plans to plan for the development of the CBD. Moreover, these studies focus on CBD concepts and model analysis rather than quantitative studies.

The mid-term spatial clustering research of foreign productive service industry is mainly driven by the study of center business district (CBD) by Murphy, Vance and Epstein. The theory of differential land rent is established in the study of spatial distribution. However, the mid-term research has gradually noted the independence of spatial clustering in the producer service industry. After the 1950s, with the development of the tertiary industry, the office industry gradually became more and more important, and the spatial clustering of the productive service industry gradually appeared as a specific study. Based on the spatial distribution study of the financial insurance industry in New York City in 1959, Hoover and Fernannon concluded that the headquarters and related service organizations of large companies are concentrated in the CBD area of the city, while the simple and repetitive offices with low output value are distributed in the suburbs around the city. In the middle and late 20th century, Western scholars discussed the inter-relationship of urban office activities, divided the levels of office activities according to production processes, and determined the locational tendency of office activities at different levels, gradually forming the office location equilibrium theory represented by Clapp, Goddard. In the 21st century, domestic researches are mainly based on the macro data of the National Bureau of Statistics. Macroscopically, Dai Jun (2004), Tang Xiaolian (2006), Chen Lifu (2007), Wen Fenghua (2008), Yang Yunpeng (2009), Fang Yuanping (2009) reform the research of the layout space structure and spatial clustering features. Microscopically, Ning Yuemin (2000) studied the relationship between production service industry distribution and urban structure through telephone yellow pages and authors (2012) through population and office layout. Recently, with the rise of big data, with the Baidu IPO big data, a new round of domestic research is on the rise. domestic research is mainly based on Big Data and Baidu IPO Big Data.

3. Research level

The research level of spatial clustering distribution of domestic and international production service industry can be divided into three categories: macro, meso and micro.

The first category of the research is based on the national and global scale. From the perspective of the economy and industry of the whole country and region, it analyzes the spatial clustering characteristics of the national production service industry and the distribution of industrial spatial structure in different cities. Chen Hongxia's research on the spatial characteristics and economic impact of China's producer service industry agglomeration shows that China's production space agglomeration presents a polarized development trend of "equilibrium-non-equilibrium". Zhou You's study on the impact of agglomeration of productive services on the intensive use of urban land through a spatial perspective shows that there is a significant spatial correlation between the agglomeration of productive service industries and the intensive use of land in China, and that the growth of productive services is concentrated. The level is conducive to the intensive land resources of Chinese urban cities. Sassen's research on global cities, and O'Connor & Hutton's research on Asia-Pacific cities shows that the hierarchical system of productive services is closely related to the urban architecture of the region. The results showed that the relationship are intensive. The higher the city level increased, the higher the type of industrial structure of the producer service industry and the more concentrated of spatial aggregation situation became. is.

The second category is the study at the regional level to explore the spatial clustering characteristics of different cities in the Pearl River Delta, the Yangtze River Delta or various urban agglomerations in urban network systems. Such research included Yuan Qingmin's comparative study on the urban agglomeration and radiation effects of the central cities of the Beijing-Tianjin-Hebei, Yangtze River Delta and Pearl River Delta cities, and Chen Hongxia's production services for the three major urban agglomerations in China. The comparison of clustering characteristics shows that the development of urban agglomerations needs to pay attention to the agglomeration and radiation functions of central cities. The advantages of balanced development of each city should be utilized, and the economic and spatial clustering rules of urban agglomerations should be grasped. Such researches clarify the latest and peripheral industrial division within the urban agglomeration, and steadily improve the economic development efficiency of urban agglomerations.

The third category is the research and analysis of the spatial clustering distribution of the productive service industry in the city. Most of these research objects are representative cities such as mega cities or big cities in each country. Harrington & Campbell's research on Washington, Searle's research on Sydney, Wang Lei's research on Guangzhou, and Gao Yanpeng's research on Shenyang found that the producer service industry generally has a central and specialized spatial agglomeration feature, and is mainly concentrated in the Central business district (CBD). However, Sam & Kee-Bom's study of Seoul, Chen Hongxia's study of Beijing and Taylor's study of London found that there is a significant difference in the spatial agglomeration situation of the production services of different types or functions.

4. Research conclusions

The spatial unity of service activities is the result of the agglomeration and decentralization of producer services in developed countries. The most representative one is that in general, in the 1960s and 1970s, producer services mainly relied on the CBD to present the core layout. After the 1970s, the production services of international metropolises were decentralized and developed, led by the United States, and subsequently in large cities such as Canada. After the 1980s, the status of suburban office centers was consolidated and a division of functions with the functions of central cities. However, not all cities have a productive service industry as described above. Baro&Soy studied Barcelona and found that the concentration of productive services in the CBD is increasing.

Since the 1960s, a series of theoretical discussions and empirical studies have been carried out on the spatial clustering evolution of urban employment, office location and production service industry. The research on spatial clustering of productive service industry is mainly concentrated in the fields of urban economics, real estate and urban geography, while urban planning research mainly focuses on the spatial layout and development of Central Business Center (CBD). For example, Daniels summarized the evolution characteristics of the spatial agglomeration of metropolitan producer service industry into four stages. The focus of urban economics on the spatial clustering of producer services is to explore the macro and micro location selection and spatial benefits of spatial clustering in the producer service industry from the perspective of maximizing cost and efficiency, such as Coffey's study of Montreal. It was found that high-level producer services showed a trend of continued agglomeration, while low-level producer services and smaller production-oriented service companies were decentralized. The research of real estate mainly focuses on the development of spatial clustering of productive service industry from the perspective of supply-demand balance, input and output and other economic profits of spatial clustering of producer services. The study of urban geography is based on the relationship between urban mechanism and spatial development structure and related influencing factors, that explores the relationship between the spatial clustering and the dynamic factors of urban production service industry. Compared with other countries, China's research objects are mainly concentrated in the developed areas. Take Beijing as an example. Zhao Qunyi and Zhou Xing, Zhao Qunyi and Xie Congpu have shown that the centralized distribution of the center of producer service industry and the pattern of peripheral point distribution are more prominent, and the whole area is in the stage of spatial agglomeration, while the inner suburbs are growth rapidly

Regarding. In Shanghai, Fu Lei's research shows that the interaction process among residents, government and economic organizations affects the evolution of urban spatial structure. However, with the gradual transformation of China from planning to market mechanism, the three factors influenced the interaction on the evolution of urban spatial structure also presents different characteristics at different stages. Regarding Guangzhou, Lin Zhangping and Pei Xiaopei found that the early stage of the financial services industry was dominated by the state-owned economy and the economic types of the newly-aggregated areas were diversified, but there was a lack of high-end financial service headquarters gathering centers similar to Western countries. At the same time, Gao Yanpeng's research on Shengyang, Nanjing, Cheng Qian Hu's research on Hangzhou, Zheng Feng's research on Nanjing, and Li Pufeng and Li Tongsheng's research on Xi'an showed that the producer service industry is generally concentrated in large areas, while areas, concentrated and dispersed are existed at the same time. The spatial structure pattern of different types of productive services does not have isomorphism. In summary, the spatial evolution characteristics of most urban producer services are not obvious, and the spatial pattern of productive services are quite different.

5. Conclusion

5.1 Summary of existing research

Taking the urban space construction as the starting point, the author summarizes and analyzes the research progress of the spatial clustering distribution of the domestic and international production service industry from the research history, methods, levels and conclusions. Based on the research conclusions, research levels, methods and research contents are sorted out. The influencing factors can be divided into five categories according to the essential attributes of the factors: social factors, economic factors, traffic factors, environmental factors, new technical factors, and policy factors (as Table 1).

Table 1. Summary of spatial clustering research in productive services

Main factor	sub-factor	related research	level	method	research content
social factors	Face to Face	Kee-Bom Nahm (1999)	Micro	Qualitative	The enterprise's labor cost is increased, and the enterprise needs to approach the human resources market; needs face to face communication with governments to promote business; the type of industry, management strategy, management methods, investment strategies, etc. within the enterprise will affect the location of the enterprise.
	Human resources pool	Scott (1988)	Meso		
economic factors	Market agglomeration factor	Armstrong (1972)	Meso	Qualitative	Factors including the total consumption and density of consumers, which reflect market demand, have an attractive effect on the layout of services and the location distribution.
		Yuanping Fang (2018)	Macro		
	Land price and rent factor	Aguilera.A (2003)	Meso	Quantitative	The factors of land cost or rent price are still the main reasons leading to the low-level production service industry or the low-level internal function of high-level production service industry and the suburbanization of small-scale production service enterprises.
		Xiaopei Ya (2007)	Macro		
Traffic factors	Urban road traffic	Cary Pivo (1990) Chen Xudong (2013)	Meso	Qualitative	The location of the site is located near the traffic trunk line, which can reduce the transportation cost of the employees and improve the efficiency of communication between the customer and the enterprise, thus affecting its spatial layout.
environmental factors	Space environment	Gao Hongcun (2010)	Micro	Qualitative	Greening, water resources, etc., are often used as advantageous resources, and have strong appeal to the distribution of leisure, tourism, and creative industries.
		Fang	Macro		
New technol	Information and	Goddard (2000)	Macro	Qualitative	The development and application of information and communication technology triggered by the information technology revolution has had a

ogy factors	communica tion tech	Leinbach T R	dual impact on the spatial agglomeration of metropolitan producer services.		
		Wheeler J O			
Policy factors	Governme nt planning and policy guidance	Wang Ruyuan (2002)	Meso	Quantitative	The location choice of the producer service industry is the result of the combination of market rules, government planning and urban characteristics, including economies of scale and external linkages.
		Xue Dongqian (2011)	Macro	Qualitative	

5.2 Overview of existing research

In general, with the specialization and large-scale development of the producer service industry, relevant research on China's productive service industry has received achieved more and more attention, but the related research on spatial clustering of the productive service industry is lake of accumulation and mainly affected by foreign research. The research based on China's own characteristics needs to be launched as soon as possible. In general, there are three characteristics of current research situation:

(1) Research on Chinese characteristics is weak

Foreign governments have less intervention in market-oriented behavior, China is in the economic catch-up period, and the producer service industry is controlled by the dual forces of the market and the government, and there are obvious differences with the Western countries. And China is the typical type of the high concentration environment in Asia. The main conclusions of European and American studies are not suitable for China (such as the human pool element). The existing research is following the conclusions of foreign research, resulting in many research conclusions are not suitable for the domestic environment.

(2) Differences in research levels at home and abroad

Existing domestic research mainly relies on statistical data released by governments at all levels, but the public data is mainly macro-based, and the micro-street and finer data are rare. However, enterprise research requires a lot of manpower and material resources. Mainly concentrated in the provincial and municipal macro-level research, which led to the study of feature-based descriptions, rather than insufficient research on dynamic mechanisms. The foreign research has experienced the macroscopic research period such as the summary of spatial characteristics. With the more detailed data of the government, the research on the enterprise is more refined, and concentrated on the medium and micro level, which enormously supports the research of the evolutionary dynamics of the industry.

(3) The systematic nature of research needs to be improved

Such research is a study of the market. It is generally difficult for foreign governments to support such research. Research-based enterprises are more likely to consult for a certain type of enterprise. The research conclusions are rarely disclosed, and the system city has certain limitations. Due to the government's GDP assessment, China's government intervention in market behavior has led to the relative popularity of public research. However, the existing Chinese research often ignores the essential characteristics of the producer service industry, and regards the productive service industry as a unified whole, and studies its distribution characteristics of the overall clustering in a single region or urban space, but does not study the productive service business and other spatial relationship, which between industry a makes it difficult to grasp the inherent dynamics and differences of spatial clustering characteristics and evolution patterns of producer services.

5.3 Prospects for spatial clustering research of productive service industry in the future

With the emergence of new technologies and new materials in this century, as well as the problems of transnational borders such as the warming of the earth and the widening gap between the rich and the poor in society, we should pay more attention to the research of productive service industry based on the original research to promotes social progress and industrial development.

(1) Taking Chinese characteristics as a breakthrough point

Because China's population is highly dense, the government played a strong role in the economy to make China as a microcosm of Asia's high-density countries and a special case. How to use China's advantages to overcome the disadvantages of the producer service industry is a feature of research. Therefore, it is necessary to combine the characteristics of China's politics, economy and society to refine the research.

(2) Micro-development trends in research

With the development of the era of big data, the access to enterprise information and the distribution of relevant data has become within reach. Therefore, the research level of the producer service industry will inevitably break through the constraints of existing data and move towards refined and systematic development. In terms of research methods, the research will establish quantitative models based on data such as economic census data and industry indicators, and methods for conducting questionnaire surveys within enterprises are also receiving increasing attention. The individual data of the enterprise survey and the quantitative model based on big data will be comprehensively used. Moreover, the market, government, citizen, and ecological environment will be used to optimize and promote the spatial agglomeration of the productive service industry.

(3) Taking enterprise drive as the core research goal

In the past, spatial research was mainly divided into majors, describing the static layout characteristics of industrial space, and it is difficult to touch the core of the formation mechanism research. The research conclusion is also a summary of historical features, and it is not very guiding for future development. Under the trend of multidisciplinary research integration, it must be guided by problems and break through the constraints of disciplines. As the protagonist of space selection for productive service industry, the spatial decision-making mechanism must become the core of research motivation. This requires the interdisciplinary research of geography, urban planning, economics, and enterprise management to get through the space research, and make the research of spatial clustering in the past can truly guide the future construction of urban space.

(4) Establishing an eco-city value target

As the consumption economy consequence with wasteful resources and other disadvantages gradually recognized by the world, the single-market-oriented industrial development model and consumption-based GDP economic construction model will become the past, circular economy, low-energy economy, sharing economy and other new development model is all about the goal of building an eco-city. The public space resources represented by the government will become an important force in the distribution of industrial space outside the market competition, that will reshape the power of urban spatial resource distribution. Urban space research is not only telling the facts and giving a history of value judgment, but also participating in the goal of protecting the earth and enhancing the values of resource utilization efficiency.

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