

Basic Characteristics, Spatial Disparity and Its Major Influencing Factors of Service Industry in China

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Abstract: Based on the analysis of its basic characteristics, this article investigated the disparities of Chinese service industry among the three regions (the eastern China, the western China and the middle China) and inter-provincial disparities of that in the three regions by Theil coefficient and cluster analysis. Then, major factors influencing its spatial disparity were explored by correlation analysis and regression analysis. The conclusions could be drawn as follows. 1) The development of Chinese service industry experienced three phases since the 1980s: rapid growth period, slow growth period, and recovery period. From the proportion of value-added and employment, its development was obviously on the low level. From the composition of industrial structure, traditional service sectors were dominant, but modern service sectors were lagged. Moreover, its spatial disparity was distinct. 2) The level of Chinese service industry was divided into five basic regional ranks: well-developed, developed, relatively-developed, underdeveloped and undeveloped regions. As a whole, the overall structure of spatial disparity was steady in 1990–2005. But there was notable gradient disparity in the interior structure of service industry among different provinces. Furthermore, the overall disparity expanded rapidly in 1990–2005. The inter-provincial disparity of service industry in the three regions, especially in the eastern China, was bigger than the disparity among the three regions. And 3) the level of economic development, the level of urban development, the scale of market capacity, the level of transportation and telecommunication, and the abundance of human resources were major factors influencing the development of Chinese service industry.

Keywords: service industry; Theil coefficient; Pearson correlation coefficient; cluster analysis; spatial disparity; China

1 Introduction

With the acceleration of economic globalization and the rapid development of information technology, global industrial structure has moved from an industrial-based economy to a service-oriented economy, which demonstrates that the development of service industry has become a major driving force to economic growth as well as an important indicator of economic modernization. Recently, the characteristic of spatial disparity and its major influencing factors of service industry become a main topic concerned by foreign and domestic scholars. Based on the regional scale, Daniels (1985) investigated the spatial disparity of service industry in European

Union. Based on the empirical study of typical nations in Western Europe and North America in the 1970s and 1980s, Illeris (1989) proved that the development level of service industry in metropolitan areas had generally been higher than other areas. Service companies with different functions revealed a phenomenon of geographical agglomeration by forward and backward linkages to form "complex of corporate activities" in many global cities (Coffey and Bailly, 1992). Compared with manufacturing industry, service industry not only depended more on local market capacity, but also had more spatial agglomeration effects (Illeris, 1993; Hong, 2003). Exploring the spatial distribution of service sectors in Guangzhou, China and Boston, United States,

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respectively, Yan and Yao (1997) and Denise and Wilian (2002) confirmed that service industry has higher spatial agglomeration characteristics. Regional disparities and the factors influencing Chinese service industry had been explored by econometric models, but they paid a little attention to the spatial characteristics of Chinese service industry from different spatial scales (Li, 1994; Jiang and Li, 2004; Li, 2004; Ni, 2004; Ji et al., 2004). Applying the hierarchical linear model, Hu (2007) attested the influence of agglomeration effect on service industry development in urban areas. Focusing on the characteristics of service sectors and regional development, Cheng's study (2003) revealed that Chinese service industry had distinct inequalities in regions and sectors. Ren (2005) conducted a comprehensive evaluation of the development level of Chinese service industry by the indexes constitute of development level, growth ability, basic condition, public environment and comparative advantage of service industry in different regions. According to regional concentration level of 11 service sectors in China, developed areas were considered as major gathering places for service firms (Ma and Liu, 2006). Based on the development of Chinese service industry and fiscal and taxation policy, Xia (2007) argued that the disparities of Chinese service industry between urban and rural, coastal and inland were obvious.

Based on the analysis of basic characteristics of service industry in China, this article investigated the disparities of Chinese service industry development in the three regions and inter-provincial disparities of that in the three regions by Theil coefficient and cluster analysis. Here the three regions refer to the eastern China, the middle China and the western China. The eastern China includes Beijing, Tianjin, Hebei, Liaoning, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong, Guangxi and Hainan. The middle China includes Shanxi, Inner Mongolia, Jilin, Heilongjiang, Anhui, Jiangxi, Henan, Hubei and Hunan. The western China includes Sichuan (including Chongqing), Guizhou, Yunnan, Xizang, Shaanxi, Gansu, Qinghai, Ningxia and Xinjiang. Furthermore, major factors influencing spatial disparity of Chinese service industry were explored by correlation analysis and regression analysis. The aim of the paper was to discuss the spatial rule of service industry development and provided a scientific basis for the further development of service industry.

2 Data and Methods

2.1 Data sources

The basic data were from *China Compendium of Statistics 1949–2004* (National Bureau of Statistics of China, 2005), *China Statistical Yearbook 2006* (National Bureau of Statistics of China, 2007a), *China City Statistical Yearbook 2006* (National Bureau of Statistics of China, 2007b), *China Statistical Yearbook on Science and Technology 2006* (National Bureau of Statistics of China, 2006), and statistical yearbooks of related years of 31 provinces, autonomous regions and municipalities in China. Also we attained some information from Statistics Database in China Economic Information Network (<http://www.cei.gov.cn/>). Considering the price inflation, GDP values in different periods had been converted into nominal values.

2.2 Methods

Theil coefficient, proposed by Theil and Henri in 1967, is an important indicator in measuring regional inequalities. There are two ways to calculate this value: Theil coefficient T and Theil coefficient L . The difference is that the former is based upon GDP-weighted, while the latter is population-weighted (Chen and Huang, 2006; Liu, 2006). This article uses Theil coefficient T to measure the regional disparity of service industry development, its evolution of spatial inequalities among the three regions, and inter-provincial disparities in the three regions of China.

Taking province as the basic regional unit, overall degree of disparity in service industry (T_p) is calculated by Theil coefficient using the Equation (1):

$$T_p = \sum_i \sum_j \left(\frac{Y_{ij}}{Y_i} \right) \ln \left(\frac{Y_{ij}/Y}{P_{ij}/P} \right) \quad (1)$$

where Y_{ij} is the value-added of service industry in province j of region i ; Y_i is the value-added of service industry in the region i ; Y is the total of value-added of service industry in all provinces; P_{ij} is the population in province j of region i ; P is the whole population. Theil coefficient implies the regional disparity and can be further decomposed:

$$T_p = T_b + T_w = \sum_i \frac{Y_i}{Y} \ln \left(\frac{Y_i/Y}{P_i/P} \right) + \sum_j \frac{Y_j}{Y_i} \ln \left(\frac{Y_{ij}/Y_i}{P_{ij}/P_i} \right) \quad (2)$$

where T_b means the disparities among the three regions, and T_w means the inter-provincial disparities in the three

regions.

Moreover, the Pearson correlation coefficient is applied to studying the linear relations between the factors, including GDP per capita and per capita value-added of service industry, GDP per capita and value-added proportion of service industry, the level of urbanization and per capita value-added of service industry, and the level of urbanization and value-added proportion of service industry from 1978 to 2005, respectively.

$$R = \frac{n(\sum XY) - (\sum X)(\sum Y)}{\sqrt{[n\sum X^2 - (\sum X)^2][n\sum Y^2 - (\sum Y)^2]}} \quad (3)$$

where n is the number of the years from 1978 to 2005; X and Y are the average values of the factors, such as the average values of GDP per capita from 1978 to 2005; R is a dimensionless index between -1 and 1 , and $R > 0$ means positive correlation between the two variables, such as GDP per capita and per capita value-added of service industry from 1978 to 2005. If the absolute value of R is closer to 1 , then the relationship between GDP per capita and per capita value-added of service industry, or the level of urbanization and per capita value-added of service industry, is closer too.

To make the samples dimensionless, the polarization standard deviation treatment is taken to the data group (X_{ij}).

$$X'_{ij} = \frac{X_{ij} - \min_i \{X_{ij}\}}{\max_i \{X_{ij}\} - \min_i \{X_{ij}\}} \quad (4)$$

In the new data group (X'_{ij}), the maximum is 1 , the minimum is 0 , and others are between 0 and 1 .

3 Basic Characteristics of Chinese Service Industry

3.1 Phases of growth process of Chinese service industry

The development of Chinese service industry experienced three phases: rapid growth period from the early 1980s to the mid-1980s, slow growth period ended in the early 1990s, and stable growth period with steady growth till now (Fig. 1).

The reason for the rapid growth in the first phase was that the government adjusted the ratio of accumulation to the consumption, and relinquished the control of consumer services. Together, these two actions unleashed

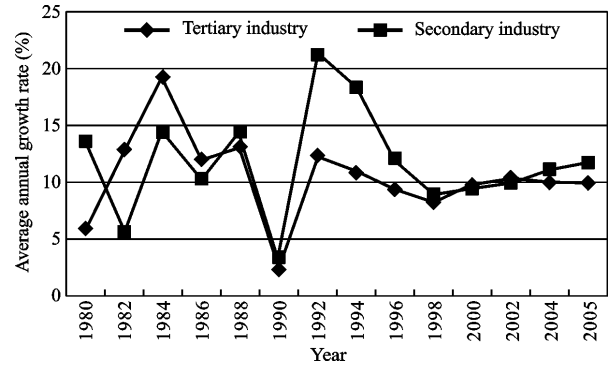


Fig. 1 Growth process of Chinese service industry in 1980–2005

the potentiality of the services market. However, after an initial boom, the effects of those two actions diminished over time leading to slow growth in the second period, since the development of the industrial economy was slow and the demand of the secondary industry for the producer services was low. Because of the impulse of the service industry policy, the development speed rose again in the early third stage. In 1992, the State Council of China published *Decision of the Central Committee of the Communist Party of China and the State Council on Accelerating Development of Tertiary Industry* which pointed out the importance of accelerating development of service industry and effectively mobilized the positive factors influencing development (the Central Committee of the Communist Party of China and the State Council, 1992). Nevertheless, due to institutional obstacles and constraining policies that have not been removed, as well as the lack of a deep understanding of service industry and the overriding focus on the industrial and agricultural fields, some developments in key services fields have been ignored. As a result, the development of service industry was mainly pulled by the secondary industry, the auto-outspread ability of service industry was poor, and did not keep at a high speed.

3.2 Proportion of value-added and employment in service industry

The proportions of value-added and employment in Chinese service industry were low, indicating that the development of Chinese service industry was remarkably on the low side. The proportion of value-added and employment in service industry rose from 21.9% and 13.1% in 1980 to 39.9% and 31.4% in 2005, respectively. Although the progress was prominent, the growth rate had ten-

ded to decelerate remarkably in the 1990s (Fig. 2).

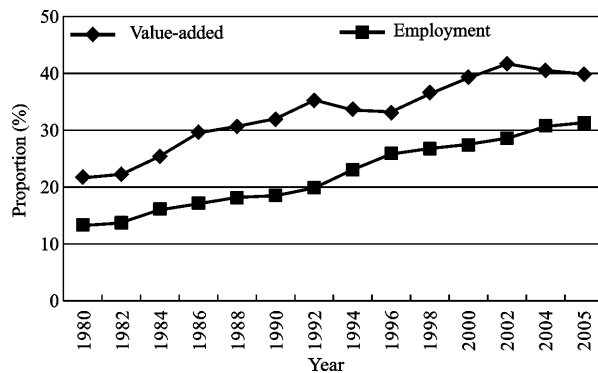
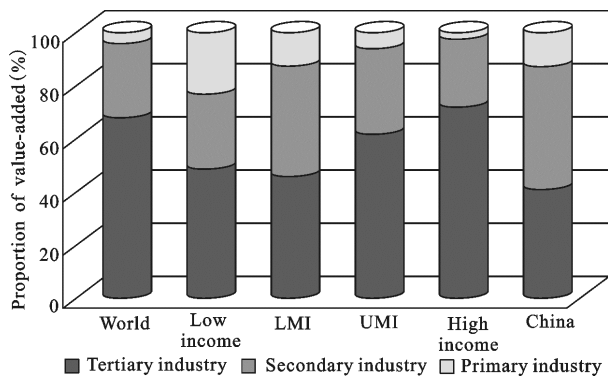


Fig. 2 Proportion of value-added and employment in Chinese service industry in 1980–2005

Compared with the countries having the same income level, the development of Chinese service industry was obviously on the low side. In 2004, the proportion of value-added in Chinese service industry was 41%, and the employment was 31%. Compared with the countries on the same lower middle income level at that time, the proportion of value-added in Chinese service industry was 5 percentage points lower, and the proportion of employment was 22 percentage points lower. The development obviously lagged behind (Fig. 3, Fig. 4).

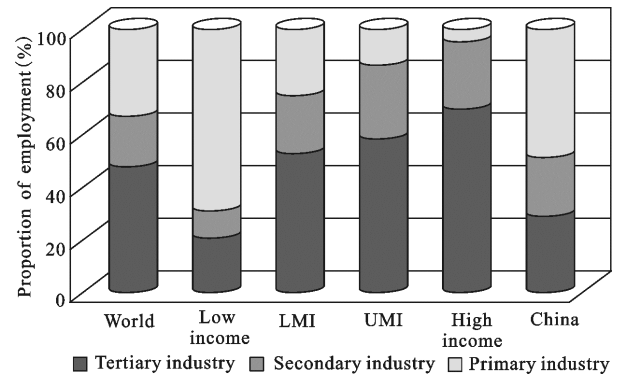


LMI: Lower middle income; UMI: Upper middle income

Fig. 3 Proportion of value-added by three industries in different countries in 2004

3.3 Structure of individual industries of Chinese service industry

From the structure of individual industries of Chinese service industry, traditional service sectors were dominant, but modern service sectors were lagged (Table 1). Traditional service sectors took a larger proportion, such as transportation and storage, wholesale, retail and ca-



LMI: Lower middle income; UMI: Upper middle income
Fig. 4 Proportion of employment by three industries in different countries in 2003

tering, which accounted for more than 40% of all the value-added in Chinese service industry. At the same time, modern service sectors, knowledge-intensive and technology-intensive industries developed slowly, such as banking and insurance, social services. Moreover, viewed from the internal structure of employment, the main sectors of employment in service industries were transportation and storage, wholesale, retail and catering, etc. At present, the employment in Chinese service industry was still in the self-adjustment period that traditional services took a dominant position, while the potentialities of modern services had not been fully released.

In addition, the development of China's producer services was relative low. According to the experience of the developed countries, the main proportion of service industry was producer services in a modern economy, which were taken as key intermediate inputs in improving labor productivity and product competitiveness for enterprises (Bayson, 1997). Due to the neglect of producer services from theoretical research to spatial structure of economic activities for a long time in China, the development of producer services had lagged far behind from consumer services. In 2002, the value-added of producer services in China reached 2.35×10^{12} yuan (RMB), which accounted for 19.3% of GDP merely (Shen et al., 2007). From the view of typical producer services, the state monopoly mechanism had always been implemented to producer services such as post and telecommunication and banking and insurance. As a result, these service sectors had a weak sense of market and poor quality of services. The development of professional service industries, mainly embodied in social services,

Table 1 Proportion of value-added and employment in Chinese service sectors

Industry	Proportion of value-added (%)			Proportion of employment (%)		
	1991	2003	Change	1991	2002	Change
Geological prospecting and water conservancy	1.1	0.9	-0.2	1.81	0.54	-1.27
Transportation and storage	17.5	8.8	-8.7	14.75*	11.42*	-3.31*
Post and telecommunication	2.0	8.2	6.2			
Wholesale, retail and catering	28.9	23.6	-5.3	27.32	27.24	-0.08
Banking and insurance	17.8	16.5	-1.3	2.13	1.86	-0.27
Real estate	5.1	6.1	1.0	0.44	0.65	0.21
Social services	6.2	12.5	6.3	5.50	6.00	0.50
Health, sports and social welfare	3.0	3.0	0	5.04	2.70	-2.34
Education, culture, art, radio, film and television	6.3	8.7	2.4	13.64	8.58	-5.06
Scientific research and poly-technical services	1.3	2.3	1.0	1.63	0.89	-0.74
Government organs, party organs and social bodies	9.2	8.0	-1.2	10.35	5.89	-4.46
Others	0.9	0.8	-0.1	17.40	34.23	16.83

Note: "*" means the sum of transportation and storage, and post and telecommunication

was lagging too (Cheng and Chen, 2001).

3.4 Disparity of regional service industry development

The disparity of regional development in Chinese service industry was distinct. From Table 2, it was clear that value-added of service industry in the eastern area was greater than the sum of those in the middle and western areas, and the proportion of value-added of service industry in the eastern area to that of China rose from 57.3% in 1991 to 63.4% in 2005, however, the proportion of the middle and western areas declined separately from 26.8%

and 15.9% to 23.7% and 12.9%. In 2005, the highest value-added per capita of service industry was 31,401 yuan in Beijing, while the lowest was 2000 yuan in Guizhou. The former was 15 times larger than the latter. From the view of employment, the proportion of people employed in service industry in the eastern area was the largest, but the proportion in the whole country declined from 48.5% in 1991 to 47.1% in 2005. In the middle area, the proportion of people employed in service industry dropped from 32.7% to 31.0%. Yet in the western area, it rose from 18.8% in 1991 to 21.9% in 2005.

Table 2 Proportion of value-added and employment in inter-provincial service industry in the three regions (%)

Province, autonomous region and municipality	Proportion of value-added	Proportion of employment	Province, autonomous region and municipality	Proportion of value-added	Proportion of employment
Beijing*	69.1 (43.7)	68.6 (43.8)	Henan**	30.0 (27.2)	22.5 (15.1)
Tianjin*	41.5 (34.7)	40.5 (29.4)	Hubei**	40.3 (25.4)	38.1 (19.4)
Hebei*	33.3 (27.4)	24.7 (17.6)	Hunan**	40.5 (25.8)	28.9 (14.2)
Shanxi**	37.4 (29.3)	30.4 (24.1)	Guangdong*	42.9 (34.5)	36.4 (25.8)
Inner Mongolia**	39.4 (24.9)	30.5 (22.2)	Guangxi*	40.5 (26.3)	32.6 (14.3)
Liaoning*	39.6 (28.2)	38.2 (25.6)	Hainan*	41.8 (30.6)	32.4 (41.7)
Jilin**	39.1 (23.7)	34.0 (23.8)	Sichuan***	40.0 (26.2)	31.6 (14.1)
Heilongjiang**	33.7 (23.3)	30.7 (25.2)	Guizhou***	39.6 (24.9)	32.3 (11.4)
Shanghai*	50.5 (31.8)	54.2 (32.4)	Yunnan***	39.5 (19.4)	20.6 (12.2)
Jiangsu*	35.4 (22.6)	33.7 (19.8)	Xizang***	55.6 (35.6)	29.3 (16.5)
Zhejiang*	40.0 (24.8)	33.5 (19.2)	Shaanxi***	37.8 (29.2)	30.7 (17.8)
Anhui**	40.7 (21.6)	27.1 (15.3)	Gansu***	40.7 (30.1)	29.1 (18.9)
Fujian*	38.5 (29.0)	31.2 (21.1)	Qinghai***	39.3 (34.1)	33.5 (19.9)
Jiangxi**	34.8 (27.3)	32.1 (16.2)	Ningxia***	41.7 (33.3)	29.3 (18.8)
Shandong*	32.0 (20.6)	29.3 (16.3)	Xinjiang***	35.7 (29.5)	33.4 (21.2)

Notes: The statistic data in bracket were in 1991, while the others were in 2005. * are the cities or provinces in the eastern China, ** in the middle China and *** in the western China; the data of Chongqing are included in Sichuan Province; The data of Taiwan, Hong Kong and Macao are temporarily vacant

4 Spatial Disparity of Chinese Service Industry

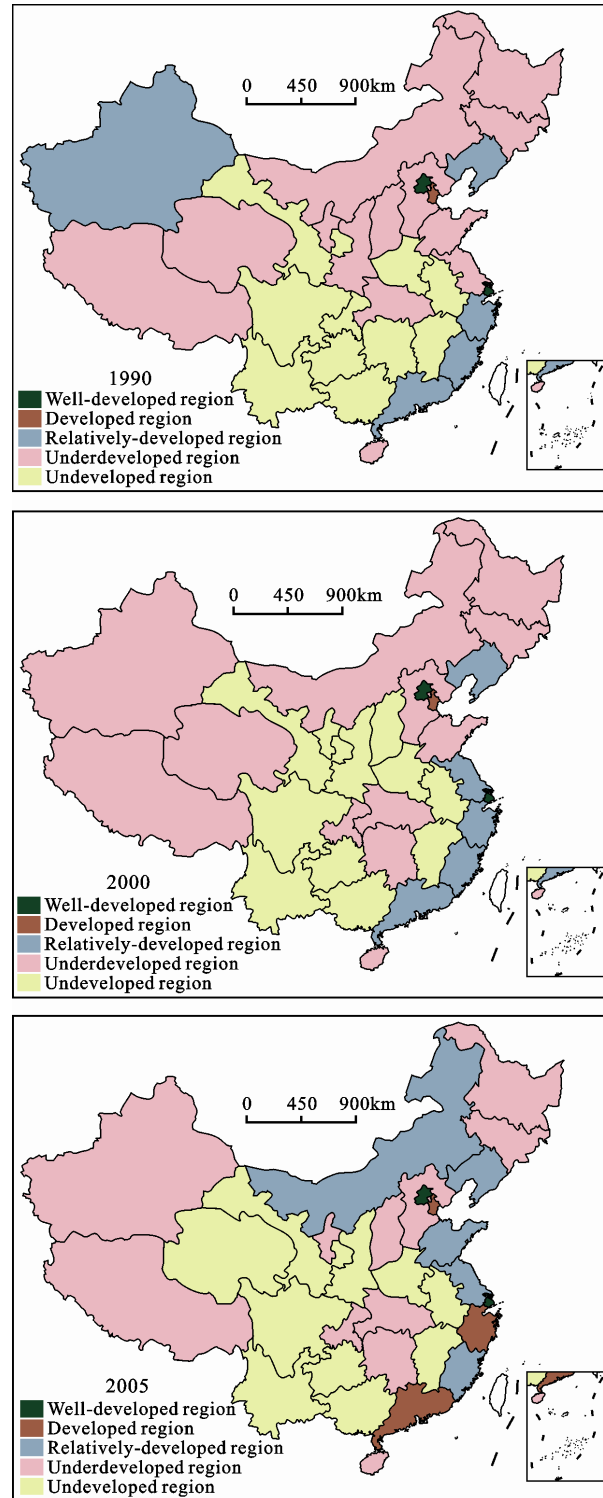
4.1 Overall structure of spatial disparity

Based on cluster analysis of value-added proportion, value-added per capita, employment proportion, labor productivity and location quotient of service industry among 31 provinces, autonomous regions and municipalities, the development level of Chinese service industry was divided into five basic regional ranks: well-developed, developed, relatively-developed, underdeveloped and undeveloped regions (Fig. 5).

There was remarkable disparity in the development levels of service industry among 31 provinces (autonomous regions and municipalities), which revealed clearly higher level for the eastern coastal regions than the middle and western China. Dynamically, stability dominated the evolution of spatial structure in Chinese service industry, and fluctuation happened occasionally. During the years of 1990–2000, Jiangsu transformed from an undeveloped service industry region to a relatively-developed one, Hunan became an underdeveloped region from an undeveloped one, and Xinjiang receded to an underdeveloped region from a relatively-developed one. Between 2000 and 2005, Guangdong and Zhejiang became developed regions from relatively-developed ones, Shandong and Inner Mongolia shifted from underdeveloped regions to relatively-developed ones, Shanxi and Ningxia became underdeveloped regions from undeveloped ones, and Qinghai receded to an undeveloped region from an underdeveloped one.

4.2 Interior structure of inter-provincial disparity

There were remarkable disparities in the interior structure of service industry among different provinces (autonomous regions and municipalities). Due to the disparity of economic development level, both producer services demand and consumer services demand in the eastern coastal provinces were greater than those in the middle and western China. The industrial structure of the most developed regions in the eastern China, such as Beijing, Shanghai, Tianjin, Guangdong and Zhejiang, had evolved into the service-based economy. In those areas, service-oriented economic structure had been primarily established, and amalgamation between producer services and modern manufacturing industries become increasingly prominent. Moreover, modern pro-



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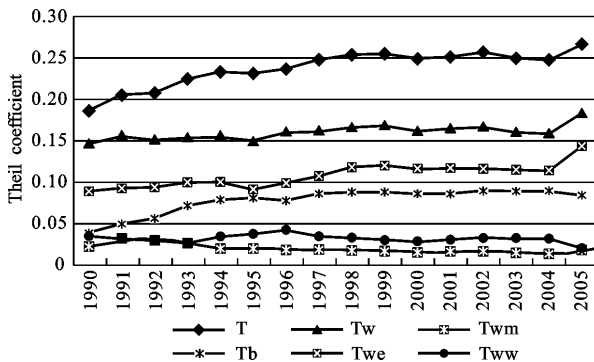
Fig. 5 Classification of spatial disparity of Chinese service industry in 1990, 2000 and 2005

ducer services sectors developed rapidly and became the main forces for service industry development, such as commercial services and computer services.

Nevertheless, the level of commercialization, socialization and industrialization lag behind in the underdeveloped middle and western provinces, which resulted in the underdevelopment of service industry. The interior structure of service industry was dominated by traditional service sectors, such as transportation and storage, wholesale, retail and catering. The consumer-oriented living services were deficient, especially in rural areas, and basic public services could not be guaranteed. Furthermore, producer services, such as information transmission, computer services, tenancy and commercial services, fail to play a leading role in upgrading the production quality and industrial structure.

4.3 Spatial disparity in different scales

The overall spatial disparity, the disparities of Chinese service industry development among the three regions and inter-provincial disparities in the three regions were measured by the Theil coefficient since the 1990s. The result revealed an expending trend of the disparity, with the Theil coefficients rising from 0.186, 0.039 and 0.148 in 1990 to 0.269, 0.085 and 0.184 in 2005 respectively. The overall disparity expanded rapidly while the disparities among the three regions and inter-provincial disparities in the three regions were correspondingly stable. The Theil coefficients of inter-provincial disparities in the eastern area rose from 0.089 in 1990 to 0.145 in 2005 while those in the middle and western China decreased gradually from 0.023 and 0.036 in 1990 to 0.019 and 0.020 in 2005 (Fig. 6).

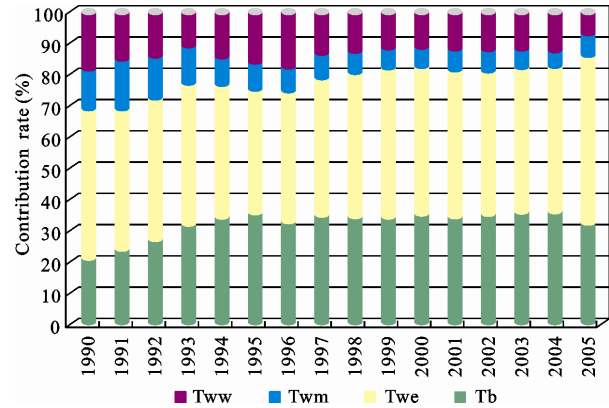


Notes: T indicates the overall spatial disparity; Tb, the disparity among the three regions; Tw, inter-provincial disparity in the three regions; Twe, Twm and Tww, the inter-provincial disparities of service industry in the eastern, middle and western China, respectively

Fig. 6 Theil coefficient of Chinese service industry development in 1990–2005

Further analysis on the contribution rates of the dis-

parities among the three regions and inter-provincial disparities in the three regions to the overall disparity indicated that inter-provincial disparities in the three regions were greater than the disparities among the three regions for the influencing degree of the whole disparity. The strongest force for the overall disparity was the inter-provincial disparity of service industry in the eastern China, whose contribution rate even reached 53.8% in 2005. The sum of contribution rates of inter-provincial disparities of service industry in the middle and western China to the overall disparity was smaller relatively and their impacts were gradually weakening, the sum of whose contribution rates was dropped from 31.7% in 1990 to 14.5% in 2005 (Fig. 7)



Notes: Tb, the disparity among the three regions; Twe, Twm and Tww, the inter-provincial disparities of service industry in the eastern, middle and western China, respectively

Fig. 7 Contribution rate of regional disparity of Chinese service industry development in 1990–2005

5 Major Factors Influencing Chinese Service Industry

5.1 Level of economic development

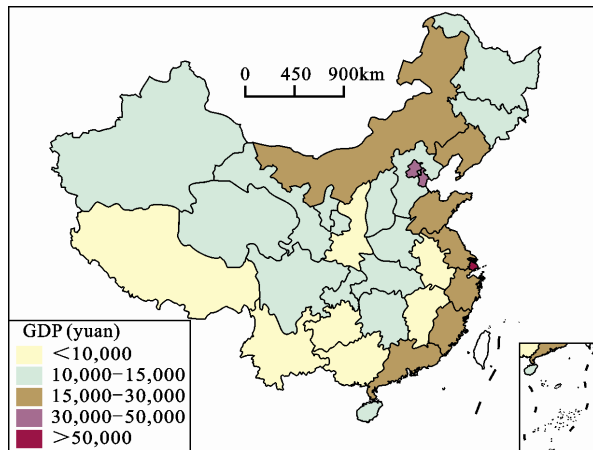
The Pearson correlation analyses on GDP per capita and per capita value-added of service industry, GDP per capita and value-added proportion of service industry from 1978 to 2005 were exerted. The Pearson correlation coefficients were 0.999 and 0.767 respectively, which implied that the level of economic development played a key role in promoting Chinese service industry development. The influencing degree of per capita GDP (PG) on per capita value-added of service industry (VA) could be measured by Equation (5):

$$VA = -454.689 + 0.406PG \quad (5)$$

$$R^2 = 0.998 \quad \text{Adj } R^2 = 0.998 \quad F = 11093.844$$

The regression result indicated notable significance of the equation. During 1978 and 2005, for each one yuan (RMB) increasing in per capita GDP, the per capita value-added of service industry increased by 0.406 yuan.

A large number of empirical studies demonstrated that there was close relationship between the level of economic development and the level of development in service industry: the countries with higher GDP per capita always had relatively higher proportion of employment and value-added of service industry, with characteristics of advancement and modernization in their industrial structure (OECD, 2001; Jiang and Li, 2004; Lei, 2006). The "de-industrialization" process in western developed countries in the 1980s had also proved the notable trend. Based on the data of GDP per capita from 31 provinces in China in 2005, the inter-provincial disparity of Chinese economic development was explored (Fig. 8). The result showed that the eastern coastal areas of China were the most developed regions, including the top 10 provinces that GDP per capita was higher than 18,000 yuan. Yet the underdeveloped regions that GDP per capita was less than 10,000 yuan were located in the middle and western China.



The data of Taiwan, Hong Kong and Macao are temporarily vacant

Fig. 8 Spatial disparity of GDP per capita in China in 2005

5.2 Level of urban development

There was a remarkable disparity in the number, size and density of urban development among the three belts in China (Table 3). The mega-cities with more than a population of 1×10^6 accounted for 56.7% in the eastern China and its urban density reached $2.176 \text{ cities}/10^4 \text{ km}^2$ in 2005, which was significantly higher than that of in

the middle and western China (0.866 and 0.239 respectively).

Table 3 City number and urban density of three regions in China in 2005

Number	Whole China	Eastern China	Middle China	Western China
Mega-city	178	101	52	25
Big city	272	131	105	36
Middle city	172	48	73	51
Small city	39	4	17	18
Total	661	284	247	130
Density of city ($\text{cities}/10^4 \text{ km}^2$)	0.689	2.176	0.866	0.239

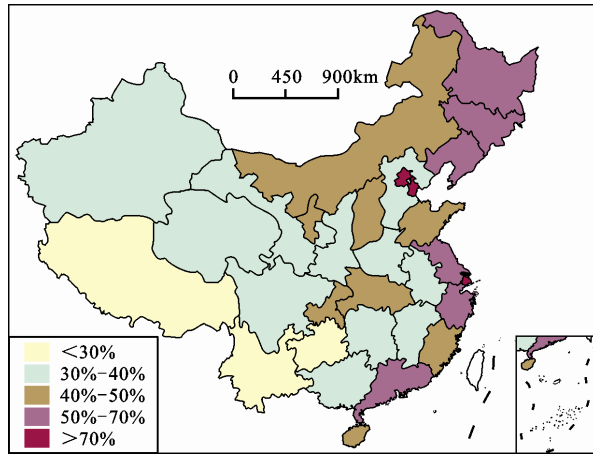
The Pearson correlation analyses on the level of urbanization and per capita value-added of service industry, the level of urbanization and value-added proportion of service industry from 1978 to 2005 were conducted. The Pearson correlation coefficients were 0.919 and 0.950 respectively, which indicated that the process of urbanization had a significant positive influence on promoting Chinese service industry development. The influencing degree of urbanization (U) on value-added proportion of service industry (VA) could be calculated by Equation (6):

$$U = 11.985 + 0.729VA \quad (6)$$

$$R^2 = 0.903 \quad \text{Adj } R^2 = 0.898 \quad F = 194.861$$

The regression result indicated notable significance of the equation. During 1978–2005, for each percentage point increasing in the level of urbanization, the value-added proportion of service industry increased 0.729 percentage points.

With the evolution of urbanization, the concentration of population and industries would promote the expansion of consumer services and producer services and support the market capacity for the development of service industry. Based on the data of the urbanization level in 31 provinces of China in 2005, the inter-provincial disparity of urbanization level was explored (Fig. 9). The result showed that the eastern coastal provinces of China were the regions with highest level of urbanization, including the top 6 provinces and cities, Shanghai, Beijing, Tianjin, Guangdong, Liaoning and Zhejiang, that the proportion of urbanization was higher than 55%. Due to the impact of planned economy system, Heilongjiang and Jilin, which were historic industrial bases in the Northeast China, also had high proportion of urbanization, 53.1% and 52.5% respectively. Comparativ-



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Fig. 9 Spatial disparity of urbanization level in China in 2005

ely, the level of urbanization in the middle and western China was much lower.

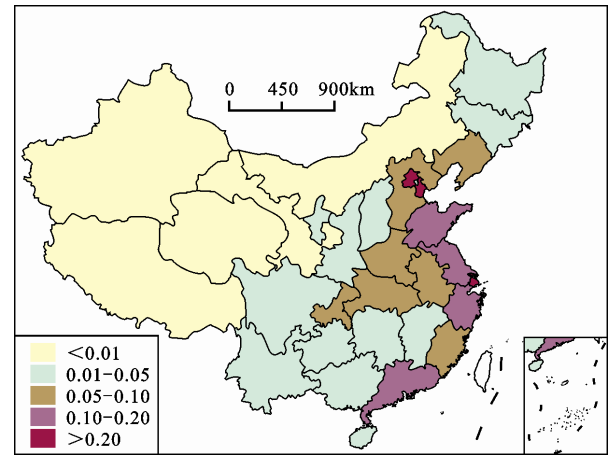
5.3 Scale of market capacity

The scale of market capacity was imperative to the development of service industry. Because production, exchange and consumption of services happened at the same time, services demand could only derived from local market rather than the market outside. A local market with huge scale could provide advanced service facilities and abundant service staff, helping to reach the threshold scale for the development of service industry. Considering demographic and economic factors, a comprehensive index was established to reflect the scale of local market capacity with Equation (7):

$$MD = \sqrt{ED \cdot PD} = \sqrt{\frac{GDP}{A} \cdot \frac{POP}{A}} \quad (7)$$

where MD means the capacity index of local market; ED means the density of economy; PD means the density of population; GDP means the gross domestic product; POP means the total population; A means the area of a region.

The result showed that Shanghai, Beijing and Tianjin, as the three province-level cities, have the greatest capacities of markets, whose scales of local market capacity (namely MD) were all bigger than 0.2, providing a huge market capacity for the development of service industry (Fig. 10). The market capacities of Jiangsu, Shandong, Guangdong and Zhejiang were also vast, which were all located in the eastern coastal provinces of China. Comparatively, the most underdeveloped markets were in Gansu, Inner Mongolia, Xinjiang, Qinghai and Xizang.



The data of Taiwan, Hong Kong and Macao are temporarily vacant
Fig. 10 Spatial disparity of market scale in China in 2005

5.4 Level of transportation and telecommunication

Transportation and telecommunication were core departments in service industry, which not only affected the size and structure of service industry, but also helped to reduce the cost of transportation and transaction of corporations so as to provide a favorable external environment for the further development of service industry. A comprehensive index was constructed to reflect the level of transportation and telecommunication as Equation (8):

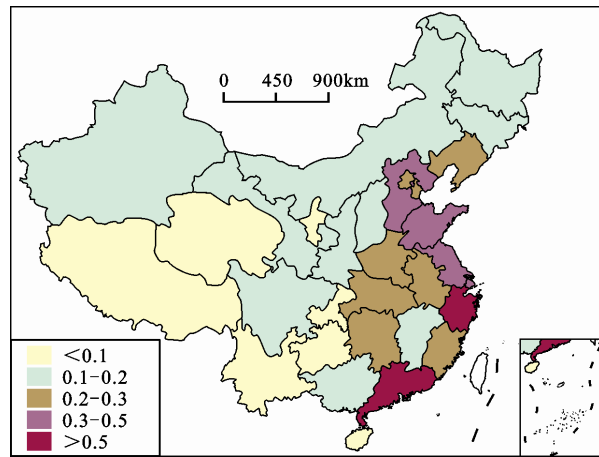
$$TT = \sqrt[5]{RS \cdot PK \cdot FK \cdot BV \cdot TP} \quad (8)$$

where TT means the level index of transportation and telecommunication; RS means per capita road area (m^2); PK means total passenger-kilometers (100×10^6 passenger-km); FK means total freight ton-kilometers (100×10^6 t-km); BV means business volume of post and telecommunication service (100×10^6 yuan); TP means average possession of telephones per 100 persons (unit).

The result showed that Guangdong and Zhejiang had the highest level of transportation and telecommunication, both indexes were greater than 0.5, followed by Jiangsu, Shandong, Hebei and Shanghai. The level of transportation and telecommunication of Chongqing, Yunnan, Hainan, Ningxia, Qinghai, Guizhou and Xizang lagged far behind with the indexes less than 0.1 (Fig. 11).

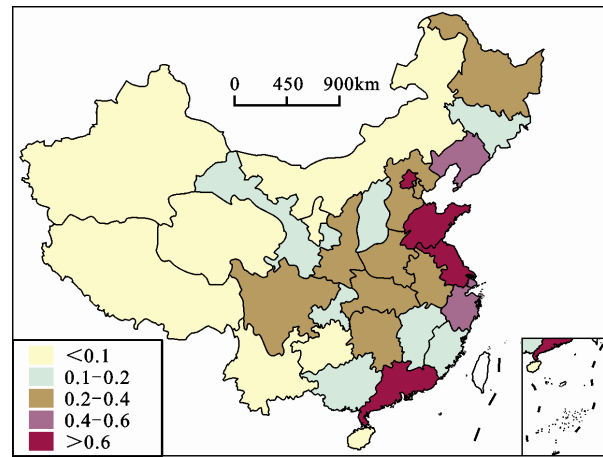
5.5 Abundance degree of human resources

The individual industries of service industry included traditional labor-intensive sectors, intellectual-intensive sectors and technology-intensive sectors. A great number of labor forces with higher level of knowledge and technology could provide intellectual support for the



The data of Taiwan, Hong Kong and Macao are temporarily vacant

Fig. 11 Spatial disparity of transportation and telecommunication in China in 2005



The data of Taiwan, Hong Kong and Macao are temporarily vacant

Fig. 12 Spatial disparity of human resources distribution in China in 2005

development of intellectual-intensive and technology-intensive service industries. Thus, the abundance degree of human resources had a crucial impact on the level and structure of service industry development. A comprehensive index was established to reflect the abundance of human resources with Equation (9):

$$HR = \sqrt[3]{SC \times RD \times EF} \quad (9)$$

where HR means the abundance degree index of human resources; SC means the number of students in university and junior college; RD means the number of R&D staffs; EF means the expenditure on R&D.

The result indicated that Jiangsu, Beijing, Guangdong and Shandong were affluent in human resources and took a distinct comparative advantage of human resources in the development of service industry, whose indexes of human resources were greater than 0.6. However, Yunnan, Inner Mongolia, Guizhou, Xinjiang, Ningxia, Qinghai, Hainan and Xizang were short of human resources, whose abundance degree indexes of human resources were less than 0.1 (Fig. 12).

6 Conclusions

(1) The basic characteristics of China's service industry could be summarized as follows. First, the development of Chinese service industry experienced three phases since the 1980s: rapid growth period, slow growth period, and stable growth period. Second, from the proportion of value-added and employment, the development of Chinese service industry was obviously on the low level. Third, from the structure of individual industries

of Chinese service industry, traditional service sectors were dominant, but modern service sectors, especially producer services, were lagged. Finally, the disparity of regional development in Chinese service industry was distinct.

(2) The level of Chinese service industry was divided into five basic regional ranks: well-developed, developed, relatively-developed, underdeveloped and undeveloped regions. As a whole, the overall structure of spatial disparity in Chinese service industry was steady in the past 16 years. But there were remarkable disparities in the interior structure of service industry among different provinces. In the most developed provinces and cities in the eastern China, modern service sectors developed rapidly and became the main force for service industry development. While in the middle and western China, the structure of service industry was dominated by traditional service sectors. Moreover, the overall disparity of Chinese service industry expanded rapidly in 1990–2005. The inter-provincial disparity of service industry in the three regions, especially in the eastern China, was stronger than the disparity among the three regions for influencing degree of the whole disparity.

(3) The level of economic development, the level of urban development, the scale of market capacity, the level of transportation and telecommunication, and the abundance degree of human resources were major factors influencing the development of Chinese service industry. The level of economic development and urbanization played a key role in promoting Chinese service industry development. The scale of market capacity,

the level of transportation and telecommunication, and the abundance degree of human resources were related closely to the development level and spatial structure of service industry.

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