Chapter 13
Evolution of Population Structure and Spatial Distribution in Shanghai Since 2000

Dan He and Yuemin Ning

Abstract Since 2000, the social-economy conditions of Shanghai has been developing rapidly, which results from the transformation of city function, the adjustment of industrial structure, the transition of the old city, and the city renewal. Correspondingly, the population structure and spatial distribution in Shanghai has made a big change. Based on data from the Fifth and Sixth National Census of Shanghai, this paper analyzed the characteristics of population changes and spatial distribution since 2000. The research findings reveal that the trend of multi-center population pattern is strengthening, and the floating population dominating the growth in suburbs becomes the population growth center of Shanghai. However, Shanghai also faces with several problems, such as population aging, shortage of professional and technical personnel, floating population pouring, high population density in the inner city, and lacking driving force of the population decentralization. The current population decentralization is mainly led by industrial suburbanization and residential suburbanization. Nevertheless, the high-quality public service and infrastructure concentrated in the inner city, lacking Mass Rapid Transit to the suburbs and slow construction of new city hindered the population decentralization. To conclude, the sustainable development of population in Shanghai still faces great challenges in the future.

Keywords New city • Population structure • Shanghai • Spatial distribution

13.1 Introduction

Since Pudong New Area started to open up in 1990s, great changes have taken place in urban Shanghai, especially in the urban spatial structure and population distribution. Coming into the twenty-first century, with the construction of

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international metropolis and the "Four Centers",[1] the implementation of the "1966 Town System"[2] and the "Twelfth Five-year Plan", the population structure and spatial distribution of Shanghai are changing further.

In the early 1990s, the transformation of the spatial structure and spatial distribution of population in Shanghai were strongly concerned by domestic scholars. Afterwards, the evolution of spatial structure and adjustment of industrial structure of Shanghai became the main topic (Ning and Yan 1995; Ning and Deng 1996; Chen 1996). Meanwhile, with the acceleration of suburbanization, the population suburbanization, traffic evacuation and industrial restructure also became the focus of the study (Peng and Ning 1998; Zhang and Du 2001; Zeng 2002; Liu et al. 2004; Xie 2004; Tan 2005). Since floating population increases, the distribution of floating population and its mechanism therefore were concerned widely (Roberts and Wei 1999; Gao and Wu 2005; Xu and Ning 2005; Wang and Dai 2005; Luo and Wang 2008). In recent years, with the expansion of the population in Shanghai, population carrying capacity, environmental problems as well as the population dispersing have become a new trend of researches (Wang et al. 2008, 2013; Zhang et al. 2013; Shi et al. 2013).

With rapid development of social-economy conditions in Shanghai, the city function region has changed and so has spatial pattern of population. Questions are raised that as follows: from 2000 to 2010, what are the characteristics of the population change and population distribution; whether the trend of population suburbanization and multi-center population pattern is strengthened or not; whether the population of inner city is effectively evacuated while these new cities absorbed these population or not. In order to understand dramatic change of population in Shanghai, this paper summarizes characteristics of population changes and spatial distribution based on the data from the Fifth and Sixth National Census of Shanghai. Furthermore, the paper also discusses dispersal mechanism of population and urban problems that Shanghai has to face, on the expectation to provide some policy suggestion.

[1] Four Centers refers to International Economic Center, International Financial Center, International Trade Center, and International Shipping Center. It, as the development target of Shanghai, was put forward firstly on Ninth Congress of the Communist Party of Shanghai in May of 2007. Xi Jinping make a report to the Congress on behalf of the eighth session of Shanghai Municipality Council. The development target of Shanghai, in the next five years, is to form the basic framework of international economic, financial, trade, shipping center. Shanghai local government plans to complete basically the construction of "Four Centers" and the modernized international metropolis till 2020.

[2] 1966 Town System refers to a town system plan of Shanghai, in which Shanghai local government aims to construct many new cities or towns to promote population decentralization from the inner city, as well as to attract migrant workers into the new cities or towns. Shanghai local government improves rural urbanization and intensive farming by merging nature villages into central villages. In order to reach the goal, Shanghai local government plans to build 1 central city (the region of about 600 km^2 within the outer ring road of Shanghai), 9 new cities (Baoshan, Jiading, Qingpu, Songjiang, Minhang, Nanqiao of Fengxian, Jinshan, Lingang, Chengqiao of Chongming), about 60 new towns, and about 600 central villages.

13.2 General Characteristics of Population Changes in Shanghai

13.2.1 Advancing Resident Population with Booming Floating Population

Along with the process of reform and opening, a large number of floating population (*wai lai ren kou*) have poured into urban Shanghai since 1980s, which contributes to the resident population's (*chang zhu ren kou*) sustainable growth in Shanghai. From 1982 to 2010, the resident population of Shanghai increased from 11.86 million to 23.02 million, which is a net increase of 11.16 million equivalent to a newly rebuilt urban Shanghai. Particularly, the period from 2000 to 2010 is the peak of population growth in Shanghai, during which the resident population increased by 6.61 million.

Despite of the rapid growth of resident population, the growth of registered population (*hu ji ren kou*) is relatively slow. From 1982 to 2010, the registered population increased slowly from 11.78 million to 14.04 million and the net increase is 2.26 million. The proportion of the registered population to the resident population gradually decreased to 61 % in 2010.

However, the floating population has been experiencing a strong, steady growth since 1980s, especially after the Development and Opening of the Pudong New Area in 1990. The number of population doubled every 5 years. From 2000 to 2010, the floating population of Shanghai increased rapidly from 3.46 million to 8.98 million, with an increase of 159 %. The number of floating population doubled every 5 years nearly and the proportion of the resident population has substantially climbed to 39 % in 2010. As a result, the floating population plays an important role in Shanghai (Fig. 13.1).

13.2.2 Aging Registered Population with Younger Floating Population

The continuing growth of resident population is contributed to the huge labor market created by the sustainable development of social economy in Shanghai since the Reform and Opening-up (Yu et al. 2012). However, the limitation of Residence Registration System (*hu kou*) and the low birth rate of the registered population in long term have resulted in the low growth and the accelerating aging trend of the registered population. Consequently, it provides an opportunity for a large number of young migrant labors to have access to Shanghai, which gives rise to greater differences in the age structures between registered population and floating population.

The Sixth National Census of Shanghai reveals that the registered population focuses on the age group ranging from 45 to 64, which indicates the obvious aging

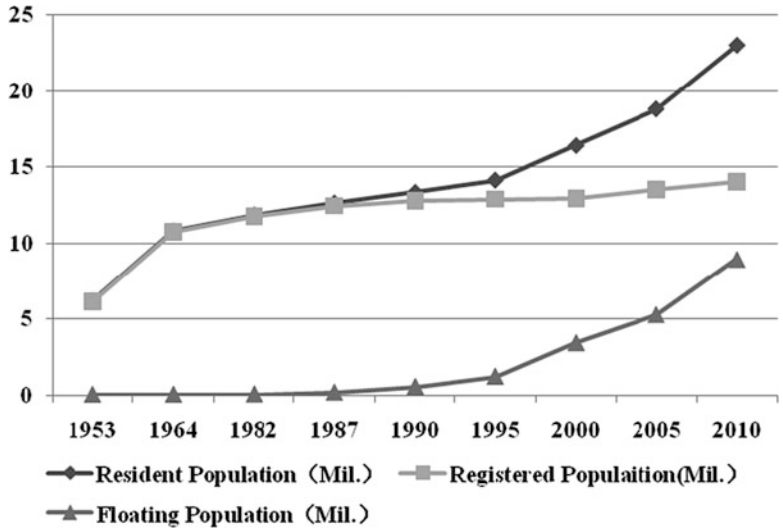

Fig. 13.1 The evolution history of population in Shanghai (1953–2010). *Sources*: Shanghai Bureau of Statistics (2009), Shanghai Bureau of Statistics (2012)

trend of registered population. By contrast, the floating population mainly centers on the age group ranging from 20 to 44, which is 1.5 times more than that of the registered population in the same age group. Furthermore, the amount of floating population is more than that of registered population in age group from 15 to 44. Although the rapid increasing of young immigrant meets the needs of the demand of labor market, Shanghai local government has to face the tremendous pressure caused by the aging problems in registered population. To a certain extent, such a great discrepancy in the age structures can relieve the pressure from the social security system and the public finances in the short term. However, in the long run, the situation will be worse, with the demographic dividend of young migrants cashed out in the near future (Fig. 13.2).

13.2.3 Diversified Floating Population Sources due to Economic Factors

In shanghai, the sources of floating population are diverse. The eastern China, e.g. Anhui, Jiangsu and Zhejiang, are the main sources of immigrants in Shanghai (Table 13.1). However, the comparison finds that the proportion of floating population from eastern China declines slightly and the proportion of Henan, Sichuan and Jiangxi increases gradually. The immigrants from central China and western China gradually become the important sources of floating population, though immigrants from eastern China still place the strong position.

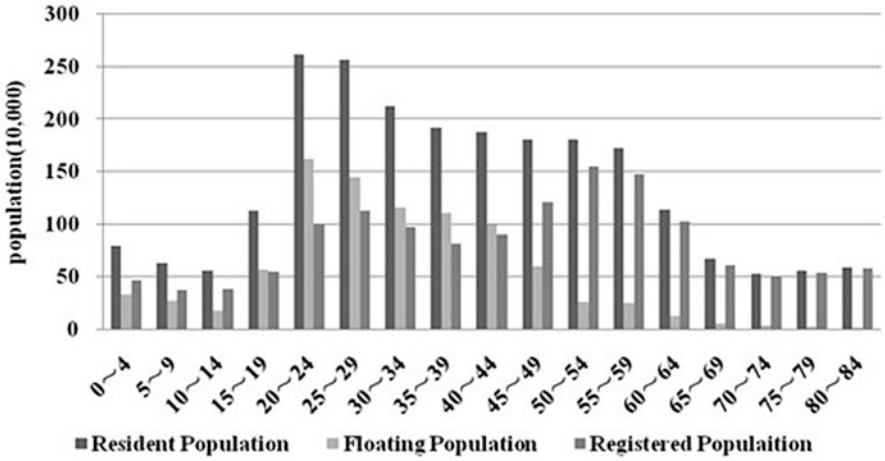

Fig. 13.2 The age structure of population in Shanghai in 2010. *Sources*: The Sixth National Census of Shanghai

Table 13.1 The source distribution and ranking of floating population in 2000 and 2010

Province	The proportion in 2010 (%)	Ranking	The proportion in 2000 (%)	Ranking
Total	100		100	
Anhui	29.0	1	32.2	1
Jiangsu	16.8	2	24.0	2
Henan	8.7	3	4.1	6
Sichuan	7.0	4	7.3	4
Jiangxi	5.4	5	6.0	5
Zhejiang	5.0	6	9.9	3
Hubei	4.5	7	2.7	8
Shandong	4.2	8	2.1	9
Fujian	2.9	9	2.8	7
Hunan	2.5	10	1.4	10
Other province	14.0		7.5	

Sources: The Fifth and Sixth National Census of Shanghai

For most immigrants to Shanghai, economic factors are the main reasons. Compared the Fifth and Sixth National Census data, it can be revealed that working and business are still the main reasons for migration. What's more, it is on an upward trend. In 2010, more than 78 % people moved to Shanghai because of working or business, and equally the proportion are near 70 % in 2000. Meanwhile, accompanying movement with family members should not be ignored, which ranks second. From these findings, it can be safely concluded that the most distinct characteristics of migration is not single but "with" the family member (Table 13.2).

Table 13.2 The reason for migration of floating population in Shanghai in 2000 and 2010

	The proportion in 2010 (%)	The proportion in 2000 (%)
Total	100	100
Working or business	78.3	69.9
Migrant with family member	8.5	13.5
Stay with relatives and friends	4.7	5.5
Learning and training	2.1	2
Marriage	2.1	2.5
Job transfer	1.7	1.2
Removing	1.1	1.7
Others	1.5	3.7

Sources: The Fifth and Sixth National Census of Shanghai

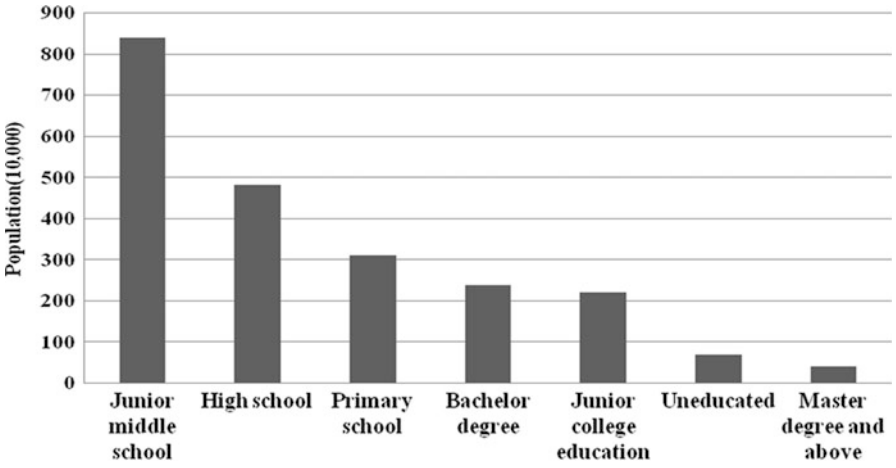

Fig. 13.3 The education level of population in Shanghai in 2010. *Sources*: The Sixth National Census of Shanghai

13.2.4 Considerably Increasing Highly Educated Talents while Still Lack of Professional and Technical Experts

The number of high educated people has increased rapidly since 2000, according to statistics in Shanghai, There are 21,892 people who have bachelor's degree, 20,953 people who gain the high school education degree, 36,519 who reach junior middle school education level and 13,561 with primary school education level in 2010 (Fig. 13.3). The number of people with a bachelor's degree doubles that of 2000. The amount of people who have Master Degree or above increased from 76,200 in 2000 to 421,800 in 2010.

Despite the rapid growth of highly educated talents in Shanghai, the professionals are still lacking in Shanghai, which is a bottleneck for Shanghai to develop advanced manufacturing industry and modern producer services. In 2008, there

Table 13.3 The professional technical talents in Shanghai in 2004 and 2008

Items	Total in 2004 (10,000 persons)	Proportion in 2004 (%)	Total in 2008 (10,000 persons)	Proportion in 2008 (%)
The total technical title personnel	138	15.15	142.8	13.71
Junior technical titles	66.9	7.34	69.4	6.66
Intermediate technical titles	54.8	6.02	55.9	5.37
Senior technical titles	16.3	1.79	17.5	1.68
The total technician and worker	57.4	6.3	58.5	5.62
Senior technician	1.5	0.16	2.2	0.21
Technician	4.7	0.52	6.3	0.6
Senior worker	12.1	1.33	14.4	1.38
Intermediate worker	39.1	4.29	35.6	3.42

Sources: National Economic Census of Shanghai in 2004, 2008

were 1.43 million people with technical titles, accounting for 13.17 % of the total number of employees. However, there were only about 180,000 people who have senior technical titles. In addition, there were only 22,000 senior technicians in the 585,000 people, which refer to the total technician and worker (Table 13.3). Compared with the data in 2004, although the absolute number of the professionals increased, the proportion of the total employees declines.

According to the experience (Wang 2009), the proportion of financial professionals in the total population should be more than 10 % if a city wants to become an international financial center. For example, the number of insurance employees in Hong Kong reached more than 350,000 people in 2007, accounting for about 10 % of the total employed population. In 2008, the number of financial professionals was 231,900 in Shanghai, only 2.2 % of total employees, which did not even reach 1/4 of financial professionals in London. Taken population of 7.5 million in London into consideration, the proportion of financial professionals in Shanghai is much smaller than London (Sassen 2001).

According to the forecast,[3] the human resource demand of Shanghai's goal to the international shipping center is about 300,000, of which the core professionals will be nearly 100,000. The proportion of modern shipping service professionals to shipping employee now is only 3.9 %, far behind that of London (60 %). It is also an obvious gap with Hong Kong and Singapore. According to the professional classification, the urgent demand of talents in Shanghai international shipping center includes international shipping management, international freight and customs clearance, shipping finance and insurance, ship driving, channel design, construction, etc. The talent gap is about 156,000.

[3] Xinhua News Agency in Shanghai reported. 2009. Xinhua News Agency. http://www.sh.xinhuanet.com/2009-04/13/content_16238372.htm. Accessed on 13 Apr 2009.

13.3 Spatial Distribution of Population

At present there are 16 districts, namely Pudong New Area, Xuhui, Changning, Putuo, Zhabei, Hongkou, Yangpu, Huangpu, Jingan, Baoshan, Minhang, Jiading, Jinshan, Songjiang, Qingpu, Fengxian, and one county, Chongming under Shanghai's jurisdiction. The administrative jurisdiction of Nanhui and Luwan were separately changed in 2010 and in 2011. In order to ensure the consistency of data, this research uses the administrative jurisdiction before adjustment. To be more specific, there are 18 districts and 1 county in Shanghai in this paper. On the basis of the previous study (Li and Ning 2007), the districts are divided into four layers: the core zone of inner city including Huangpu, Jingan and Luwan; the fringe zone of inner city including Hongkou, Xuhui, Changning, Putuo, Zhabei and Yangpu; the near suburban area including Pudong New Area, Minhang, Baoshan, Jiading; the far suburban area including Jinshan, Songjiang, Qingpu, Nanhui, Fengxian and Chongming County (Fig. 13.4).

13.3.1 Emerging Trend of Multi-Center Population Pattern with Population Declined from the Inner City to the Suburb

The population has been converging on the center of Shanghai and the single center pattern is significant. The population distribution has a significant characteristic of regional layer structure, gradually declined from the center to suburb (Fig. 13.5). The population density of the three districts in core zone of inner city was 30,000 people/km^2, while the density was 40,000 people/km^2 in 2000. The population density of the fringe zone of inner city like Hongkou, Yangpu, Zhabei, Putuo, Xuhui and Changning kept at 18,000 people/km^2 above. The population density of near suburban area like Pudong New Area, Minhang, Baoshan and Jiading was over 3,000 people/km^2, while it was 1,600 people/km^2 in 2000. The population density of far suburban area like Jinshan, Qingpu, Nanhui, Fengxian, Chongming was less than 1,000 people/km^2, except Songjiang of 2,600 people/km^2. Based on the standard of the Fifth National Census of Shanghai, the area whose population density is more than 1,500 people/km^2 is namely urban area. The urban area of Shanghai has significantly increased in decade, which reflects evident trend of sprawl outward.

The data shows that the peak of the population density mainly distributed in the center of the city, but it is noteworthy that there are multiple peaks. For example, there is a sub-highest peak in the south of Hongkou District. Meanwhile, two small population peaks emerges in Jiading Districts and Songjiang New City, which shows approaching multi-center distribution tendency of population with the new city construction (Li et al. 2010). So is the situation in Jinshan and Qingpu, whereas the population density still remains lower.

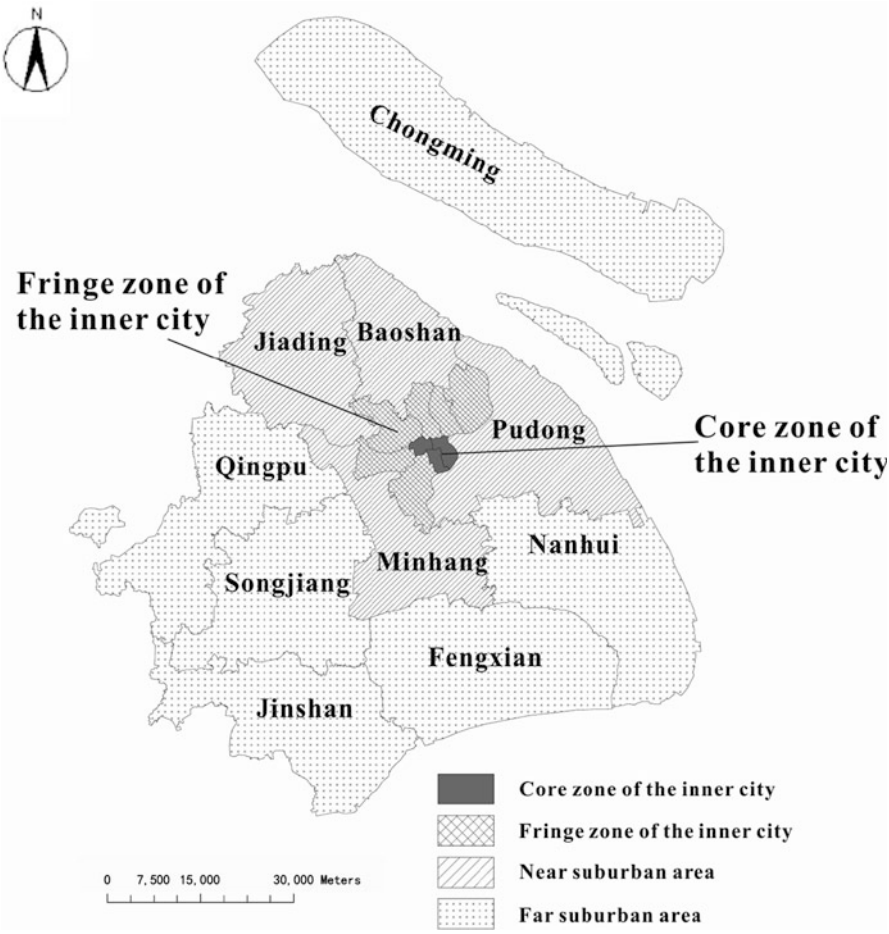

Fig. 13.4 The map of four layers in Shanghai. *Sources*: Li and Ning 2007

13.3.2 Core Growth of Population in Suburbs and Narrowing Density Gap Between Inner City and Suburbs

Faced with the traffic and environmental pressure, Shanghai local government puts forward urban policies to decentralize the population density of inner city in order to promote the population redistribution rationally, which has gained certain effects. As it can be seen from Table 13.4, the population of the whole city maintained a substantial growth, nevertheless the population of inner city increased only 56,000 in the 10 years. While the population in the core zone declined sharply by 23.43 %, the population in the fringe zone climbed gradually by 5.93 %. In the fringe zone, the population of Hongkou and Changning decreased slightly, and the other four districts increased slightly. The population of suburbs grew dramatically

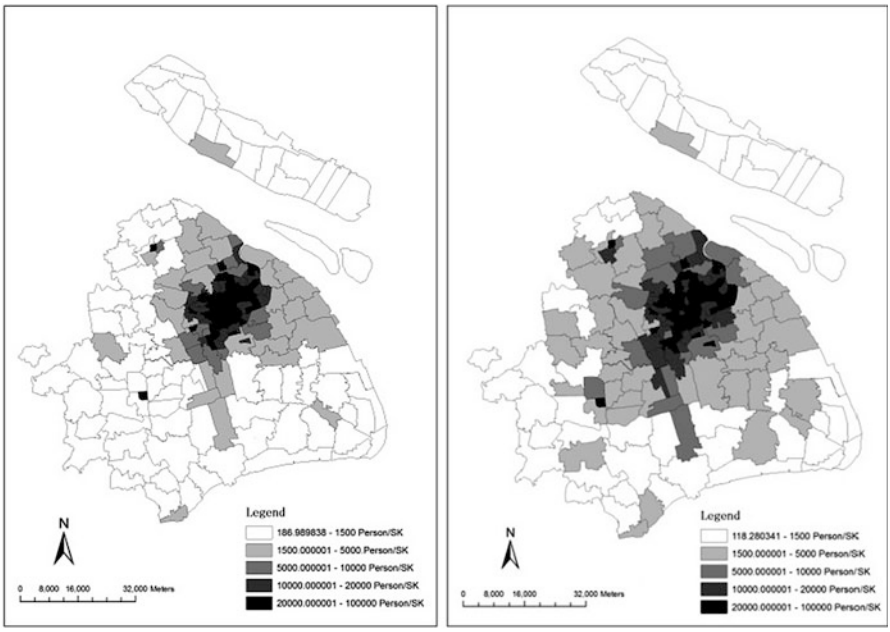

Fig. 13.5 The density distribution map of the resident population in Shanghai in 2000 and 2010. *Sources*: The Fifth and Sixth National Census of Shanghai

in comparison with that of the inner city. It is apparent that the population of the suburb area grew 6.59 million from 2000 to 2010, accounting for 99.61 % of the entire increasing population of Shanghai in this period, which indicates that the population growth of Shanghai mainly concentrates on the suburbs.

It can be seen in Fig. 13.6 that the population in most areas of Shanghai keeps growing in the past 10 years, in addition to the center area and Chongming County. The reason why the population of these two areas declined is not quite the same. The population decrease of Chongming is justifiable on grounds of her aim to construct the Ecological Island, so large numbers of people are shifted to suburban areas or inner city to seek for new jobs, which is also an obvious urbanization. Meanwhile, the negative growth of the inner city population is mainly caused by the demolition and resettlement in downtown rebuilding and jobs spreading to the suburbs, which result in suburbanization (Wu 2010).

Owing to population diffusion from inner city to suburbs, the population density of Huangpu, Luwan and Jingan dropped sharply. More significantly, the population density of Huangpu decreased from 46,300 people/km^2 in 2000 to 34,640 people/km^2 in 2010. However, at the same time, the population densities of far suburban area like Jiading, Qingpu, Songjiang, Jinshan and Fengxian all rised. The population density gap is narrowing down among districts. The gap between "peak" (the max.) and "valley" (the min.) reduced from 74.2 times in 2000 to 61.1 times in 2010. To conclude, there is still great room for suburbanization for Shanghai in the future.

Table 13.4 The change of resident population in Shanghai in 2000 and 2010

Regions	Resident population in 2000 (10,000 persons)	Resident population in 2010 (10,000 persons)	The change of population in 2000–2010 (10,000 Persons)	The change rate of population in 2000–2010 (%)
Total	1,640.78	2,301.91	661.13	40.29
Inner city	693.03	698.62	5.59	0.81
Core Zone	120.88	92.55	−28.32	−23.43
Huangpu	57.45	42.99	−14.46	−25.17
Luwan	32.89	24.88	−8.01	−24.54
Jingan	30.53	24.68	−5.85	−19.17
Fringe Zone	572.16	606.08	33.92	5.93
Xuhui	106.46	108.51	2.05	1.93
Changning	70.22	69.06	−1.16	−1.66
Putuo	105.17	128.89	23.72	22.55
Zhabei	79.86	83.05	3.19	3.99
Yangpu	124.38	131.32	6.94	5.58
Hongkou	86.07	85.25	−0.82	−0.96
Suburban Area	944.71	1,603.29	658.58	69.71
Near suburban area	558.07	959.88	401.94	72.02
Minhang	121.73	242.94	121.21	99.57
Baoshan	120.8	190.49	67.12	55.69
Jaiding	75.31	147.12	71.82	95.38
Pudong new area	240.23	379.33	139.11	53.9
Far suburban area	387.67	643.28	255.61	65.93
Jinshan	58.04	73.24	15.2	26.19
Songjiang	64.12	158.24	94.12	146.79
Qingpu	59.59	108.1	48.51	81.42
Nanhui[1]	78.51	124.98	46.47	65.03
Fengxian	62.43	108.35	45.92	73.55
Chongming*	64.98	70.37	5.39	8.3

Sources: The Fifth and Sixth National Census of Shanghai

**Note*: In 2005, the two townships Changxing and Hengsha of Baoshan district are zoned into Chongming district, so in the Sixth National Census of Shanghai Chongming district included the two town population. In order to keep the data comparability and consistency, the data of Baoshan population subtracted the two townships population in the Fifth National Census in 2000, and so the population of Chongming district included the two town population

[1]Nanhui district is zoned in Pudong district in 2009, in order to keep the data comparability and consistency, the table uses the unchanged zoned method

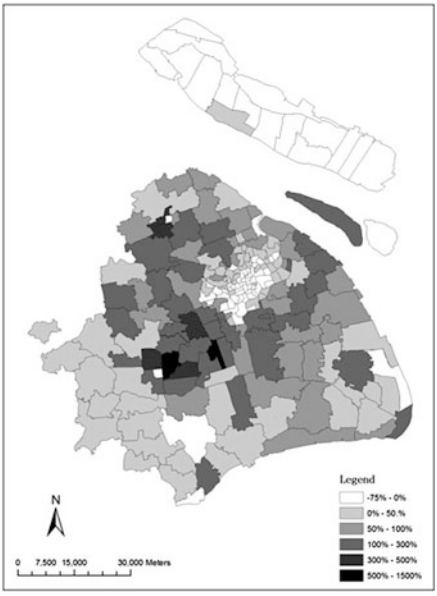

Fig. 13.6 The growth rate of population in Shanghai in 2000–2010. *Sources*: The Sixth National Census of Shanghai

13.3.3 Floating Population Dominating Population Growth in the Suburbs with Disperse Population Peaks

In 2000, 1/3 of the population was in the inner city, and 2/3 distributed in the suburbs. The floating population in the suburbs was 1.2 million more than that in the inner city in 2000, and the gap had become 5.5 million by 2010. There is only 19 % of the floating population distributing in the central city in 2010.

The floating population dominates the population growth in the suburbs. In the whole suburb it increased by 4.68 million, accounting for 91.56 % of the total increased population in the city in the past 10 years (2000–2010). The floating population in the near suburban area and the far suburban area grew respectively by 2.53 million and 2.14 million, accounting for 49.61 % and 41.96 % of the total increased population. It should be also noted that the population growth in the inner city is concentrated on the fringe zone of inner city. In recent 10 years, the floating population of the inner city grew only 432,400. However, the floating population of the core zone of inner city climbed by only 54,500, while the remaining 377,800 people mainly grew in the fringe zone of inner city (Table 13.5).

In fact, the floating population is not only the main force of population growth in the suburbs, but also approaches or exceeds the local population. By 2010, the total floating population had accounted for 45 % of the total population in the suburbs. The ratio of floating population in the near suburban area and the far suburban area respectively reached 45.58 and 44.60 %, which is far higher than that of the inner city (24.81 %). The ratio of floating population in Songjiang, Qingpu and Jiading has

Table 13.5 The change of the floating population in Shanghai in 2000–2010

Regions	Floating population in 2000 (10,000 persons)	Floating population in 2010 (10,000 persons)	The change of population in 2000–2010 (10,000 persons)	The change rate of population in 2000–2010 (%)
Total	387.11	897.7	510.59	131.89
Inner City	130.07	173.3	43.24	33.24
Core Zone	18.92	24.37	5.45	28.83
Huangpu	9.43	13.25	3.82	40.48
Luwan	4.85	5.4	0.55	11.31
Jingan	4.64	5.72	1.08	23.38
Fringe Zone	111.15	148.93	37.78	33.99
Xuhui	23.31	27.95	4.64	19.93
Changning	16.27	17.54	1.27	7.83
Putuo	23.11	36.3	13.19	57.07
Zhabei	14.4	20	5.6	38.86
Yangpu	19.68	27.53	7.85	39.89
Hongkou	14.38	19.61	5.23	36.35
Suburban Area	256.88	724.4	467.52	182
Near Suburban Area	184.21	437.51	253.3	137.5
Minhang	48.1	120.37	72.27	150.27
Baoshan	25.4	82.82	57.42	226.12
Jaiding	37.44	76.61	39.17	104.61
Pudong New Area	73.28	157.71	84.43	115.22
Far suburban area	72.67	286.89	214.22	294.8
Jinshan	6.08	20.11	14.03	230.82
Songjiang	19.05	93.74	74.7	392.18
Qingpu	16.82	60.5	43.68	259.62
Nanhui[1]	12.26	44.72	32.46	264.79
Fengxian	13.06	52.72	39.66	303.77
Chongming*	5.4	15.1	9.7	179.49

Sources: The Fifth and Sixth National Census of Shanghai
**Note*: ditto
[1]Nanhui district is zoned in Pudong district in 2009, in order to keep the data comparability and consistency, the table uses the unchanged zoned method

outstripped by 50 %. In particular, the floating population proportion of Chedun Town in Songjiang Industrial Park has exceeded 90 %. It has become not only an important driving force of economy growth, but also the main force of urbanization (Fig. 13.7).

In Fig. 13.8, the floating population density demonstrates the characteristics of diminishing in circle layer from the inner city to the suburbs. The resident population centers on the core zone of inner city and has formed a continuous development zone. In contrast, the floating population shapes several population peaks in near and far suburban area.

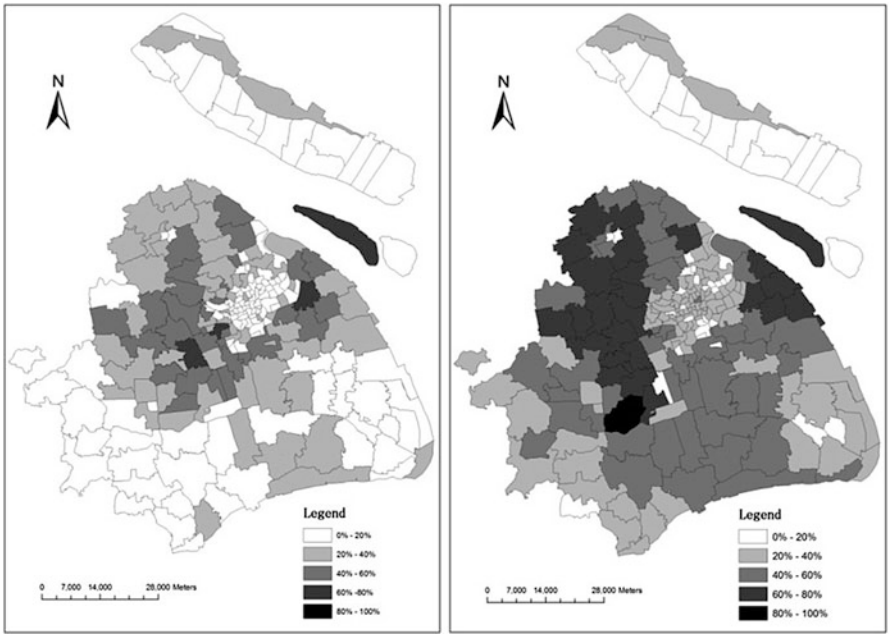

Fig. 13.7 The proportion of floating population to resident population in 2000 and 2010. *Sources*: The Fifth and Sixth National Census of Shanghai

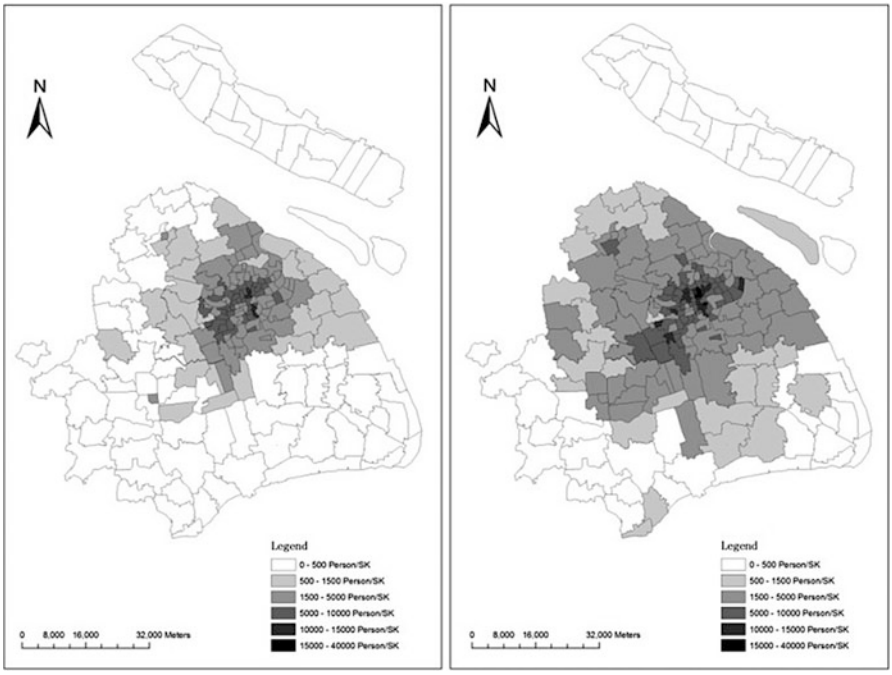

Fig. 13.8 The distribution of floating population in Shanghai in 2000 and 2010. *Sources*: The Fifth and Sixth National Census of Shanghai

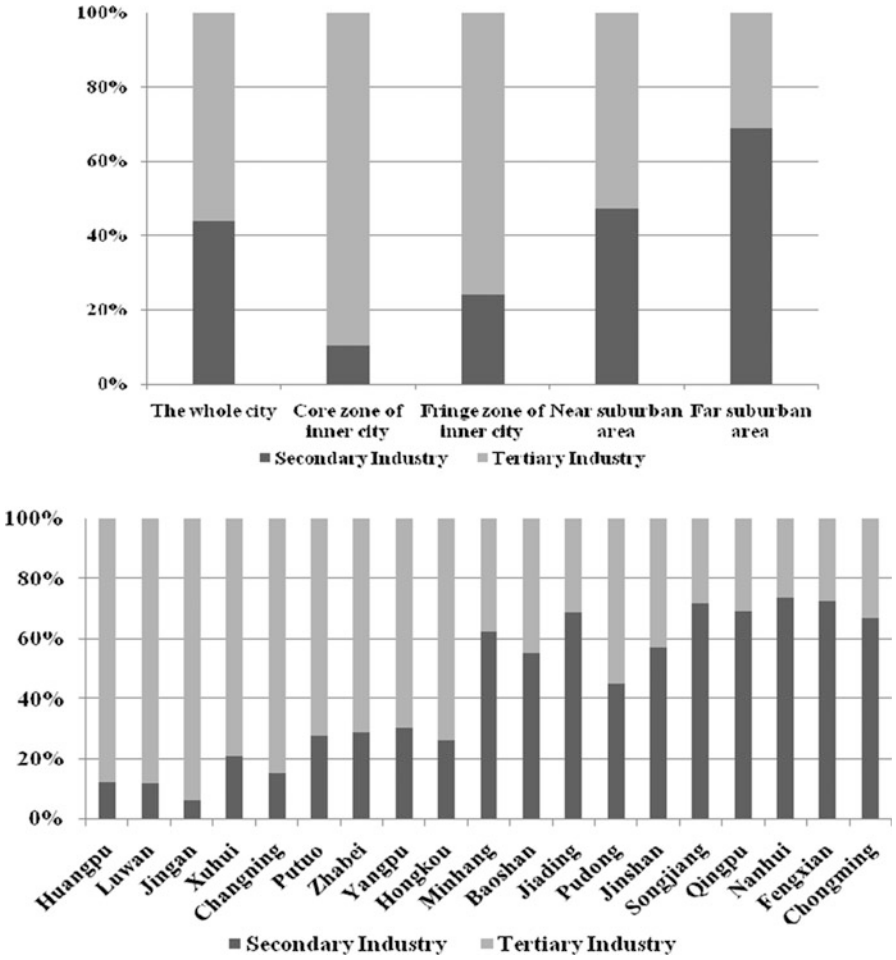

Fig. 13.9 The employment structure in different districts. *Sources*: The Sixth National Census of Shanghai

13.3.4 Highly Developed Industrial Suburbanization with Slow Suburbanization of the Retail and Office

The employment structure changes along with the migration of population. The number of employees in primary and secondary industries in Shanghai is 10.41 million in 2010. And the proportion of the two industries is almost equal. The proportion of primary industry is 47.24 %, while the secondary industry is 52.76 %. The employment structure of downtown and suburbs considered, 80 % of the employment population in the inner city concentrated in the service industry, and about 60% of employee in suburbs is mainly in the manufacturing industry (Fig. 13.9).

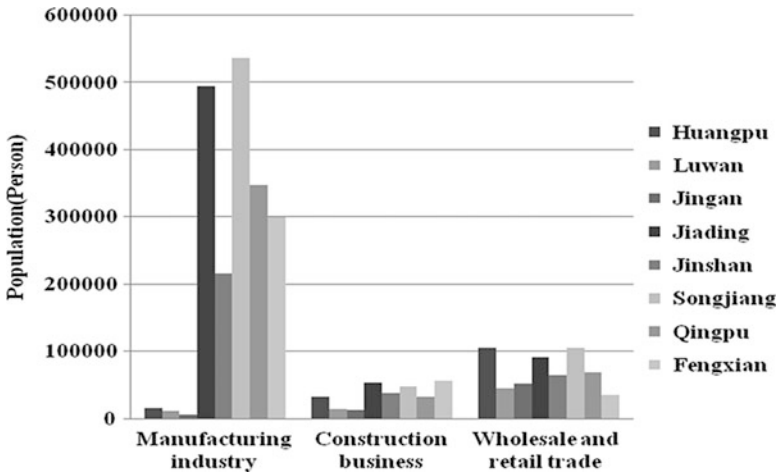

Fig. 13.10 The employment in different industry of Shanghai in 2010. *Sources*: The Sixth National Census of Shanghai

The employment situation in various districts of inner city or suburbs still remains different. The proportion of employment in service industry in core zone of inner city is around 90 %, of which Jingan District, reaching 94 %, is the highest. At the same time, the proportion of employment in service industry in suburbs is 70–80 %. The secondary industry employment population in the suburb is generally higher than the average, expect Pudong New Area. The proportion of employment in secondary industry in the near suburban areas in 60 %, and the proportion in the far suburban area is about 70 %. The employment population of secondary industry rises while the employment population of tertiary industry steps down from the core zone of inner city to the far suburban area, which reflects the characteristics of "industrial suburbanization" in Shanghai (Zhou and Ma 2000).

Compared with the prosperous industrial suburbanization, the retail and office suburbanization develops relatively slowly. The employment population proportion of wholesale and retail industry in the tertiary industry is largest both in the five districts in the far suburban area and the core zone of inner city (Fig. 13.10). But the leasing and business services, accommodation and catering industry, the real estate industry and the financial industry vary greatly between them. There are very few employees in the financial industry in the five suburban districts, and employment population of accommodation and catering industry and the real estate industry is 2 % below, which shows that there is great gap between the core zone of inner city and suburban area in finance, leasing and business services, real estate and other modern service industry, and the development of accommodation and catering industry, transportation, storage and postal industry and other traditional service industry in the suburban area is relatively backward as well. And only the development gap of the wholesale and retail industry is smaller. The

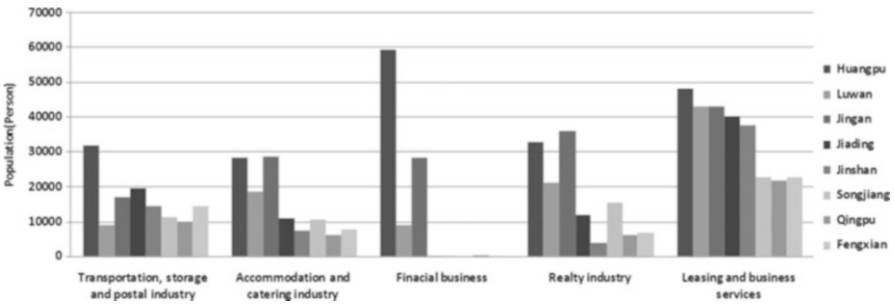

Fig. 13.11 The employment in different sectors of tertiary industry of Shanghai in 2010. *Sources*: The Sixth National Census of Shanghai

five suburban districts absorb massive employees in manufacturing industry and at the same time the service industry does not develop equally. The traditional service industry like traditional accommodation, catering and other personal and family services remains for further improvement in the future. Furthermore, the development of service industry in the five suburban districts still has a long way to go.

13.3.5 Lack of MRT in Suburbs Resulting in Tardy New City Construction and Population Decentralization

Mass Rapid Transit (MRT) has the advantages of large capacity, long distance and high attainability, which makes it one of the most important means of transportation during the commuting time in mega cities. The main MRT lines which connect inner city and suburban areas are the urban land expanding axis (Meng and Xu 2007). The pattern of Transit Oriented Development (TOD) has become an important way for industrial layout, population distribution and land use, especially in some international city, such as New York, Tokyo, Hong Kong (Loo et al. 2010). The connection between the inner city and suburbs is established by large quantities of MRT, which would promote the population decentralization to solve the problem of high population density of inner city (Qi and Zhao 2007).

By the end of 2013, Shanghai has built 13 Metro (including the Maglev), with three lines under construction. The Shanghai Metro network is preliminary formed. Figure 13.11 reveals that population density has a close relation with Metro distribution. The population density in the inner city where Metro spreads all over is very high, meanwhile, the suburban area, where Metro can arrive like Minhang, Songjiang, Jiading, had much higher population density than the other suburban areas. As for the growth rate, where the population grows rapidly mainly concentrated in Minhang, Jiading New City and Songjiang New City where Metro can arrive directly. The population of other suburban areas, where no Metro

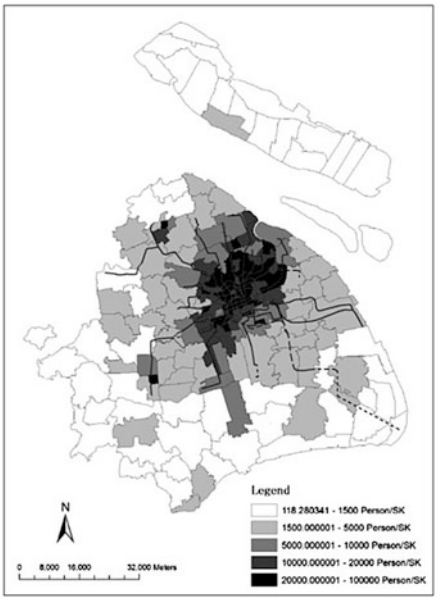

Fig. 13.12 Population density and MRT in Shanghai in 2010. *Sources*: The Sixth National Census of Shanghai

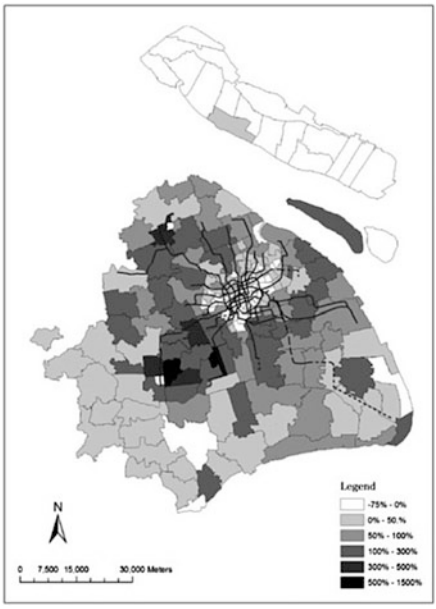

Fig. 13.13 Population growth rate and MRT in Shanghai in 2000–2010. *Sources*: The Fifth and Sixth National Census of Shanghai

reached, grows relatively slowly (Fig. 13.12). Therefore, the convenient MRT connected inner city to suburban areas, to a certain extent, can greatly promote the population flowing from the inner city to suburban areas, and accelerate the population growth and agglomeration in suburban areas (Fig. 13.13).

"1966 Town System" is in no doubt the highlights of the Eleventh Five-year Plan in Shanghai. It plans to construct a number of new cities (*xin cheng*) to promote population decentralization and enhance the level of urbanization. The data show that Minhang, Jiading New City and Songjiang New City attained rapid population growth among the nine planning new cities. The three new cities have solid industrial foundation, long urban histories and good infrastructure, which is a strong attraction to population. The pro-growth urban policy (He and Ning 2008) and Metro construction further promoted these areas become the most attractive regions for the population in inner city with the background of industrial and residential suburbanization. However, the other new cities have the weaker development foundation and lack Metro, which results in a weak attraction to population. To some extent, the potential employment opportunities and convenient traffic condition are the main reasons for population agglomeration in suburban areas (Chen et al. 2009).

13.4 Discussion and Conclusion

The rapid economic growth not only reshapes the skyline but also the population structure and spatial distribution in urban Shanghai. This paper analyzes the characteristics and spatial distribution changes of the population in Shanghai based on the Fifth and Sixth National Census of Shanghai. The research findings reveal that population of Shanghai shows new features, mainly for sustained growth of resident population and explosive growth of floating population. The registered population is aging, while the chief component of floating population is youngster, who contributed to the booming of labor market in Shanghai. To be more specific, the source of floating population is countrywide, but mainly from the central and eastern China. And the main reason of their moving to Shanghai is working or business, as well as the reason, moving with family number, cannot be ignored. Meanwhile, highly educated personnel have been increasing significantly, but technical personnel are still in desperate need. With the influence of industrial and residential suburbanization, population spatial distribution in Shanghai has transformed correspondingly. The trend of multi-center pattern has emerged and suburban areas have become the hotspot of population growth, which results from the dispersed population concentrated in several new cities where the potential employment opportunities and traffic conditions are better than other regions. The industrial suburbanization develops rapidly, but the retail and office suburbanization develops relatively slowly. Therefore, the floating population, who seek for the job opportunities, has dominated the population growth in suburban areas, particularly near the industrial park. As a result, the population density gap between inner city and suburban areas is narrowing down.

Although population growth of the inner city is slowing down, the pressure of population decentralization is still tremendous. As mentioned above, the general

trend of population growth has shifted to the suburban areas. On the one hand, along with rising income, some middle-class residences begin to see suburban estates as alternative places to improve their housing conditions. On the other hand, many residences are relocated into the suburbs through urban redevelopment, which the old neighborhoods are demolished to make space for office and commercial buildings and high-end apartment. However, the population density of inner city is too high compared with other international metropolis (Walcott and Pannell 2006). The flourishing urban economy, diversified employment demand and perfect public service, especially good education facilities and hospitals make most people willing to live in the inner city of Shanghai.

The suburban area become the hotspot of population growth, nevertheless the driving forces of decentralization in different area are distinctly different. Those relocated residences from inner city, owing to the relatively low housing costs and accessed to the public service of inner city, are more inclined to live in the near suburban areas which similar to the commuter zone in the metropolis of developed countries (Hanlon et al. 2009; Jun et al. 2012). If there were no rational urban policies to control the random property-oriented development, the near suburban areas perhaps become a hard-hit area of urban sprawl. In this case, it is quite hard to realize the expectations of population decentralization, rather, it will bring many problems, e.g. environmental impact, increased in traffic and traffic-related fatalities, delays in emergency medical services response and fire department response times and increased infrastructure costs and personal transportation costs (Brueckner 2000; Habibi and Asadi 2011), to urban development in Shanghai. Moreover, the new cities or towns near the industrial park in near suburban area become the attractive resident area for the people who want to find the jobs in industrial park, particularly, Minhang, Jiading New City which have long history of industrial development and good infrastructure facilities. Therefore, both the residential decentralization and industrial suburbanization are main driving forces of the development in near suburban area.

In far suburban area, the phenomenon that the industrial suburbanization promotes population concentrations is rather significant. The potential employment opportunities attract more people, particularly the migration workers, to settle in new cities or towns near the industrial park. The industrial park, on the other hand, provides the affordable housing or dormitory to migration workers. The migration workers trend to the work-oriented settlement with a low-cost living condition. In addition to the above, those attractive new cities in far suburban area, e.g. Songjian New City, as same as Minhang, Jiading New City in near suburban area not only have strong industrial foundation and good infrastructure facilities but also have the convenient Metro connect to the inner city.

Therefore, the significant population center scattered in the specific new cities, in which the good living environment, employment opportunities, cheap housing prices and rapid access to inner city are their common characteristics. In comparison, the other planned new cities in “1966 Town System” are less developed.

In other words, these specific new cities have formed the local industrial and commercial centers before the policy of "1966". The attempts, which merely rely on urban development policies to promote the population agglomeration, are impossible. From the analysis above, it can be concluded that the planning guidance and market promotion should be combined according to the economic laws. The government should support and encourage the development of spontaneous market cities, and avoid vanity projects and political game that are divorced from reality. The spatial distribution of population should be compatible with the city function regions and the development direction of Shanghai (Li and Ning 2007).

Finally, some suggestions are proposed as follow. Population decentralization in Shanghai needs to accelerate the development of MRT network, which not only connect the suburbs to inner city but also links among the new cities (Mu and Jong 2012). The whole transport network can be the "vessels" that can decentralizes population to the suburban areas gradually and rationally move among the new cities, and ultimately the multi-center population pattern will be formed. On the other hand, the function of inner city should transfer to the suburban areas gradually. Along with industrial and residential suburbanization, the public service function, such as hospitals, schools, company office buildings and government sectors, should transfer to the suburban areas properly as well. The new public service zones combine with local market, and the function of new cities will become more and more consummate. It is more important to build up the new cities containing living, working, services, entertainment, rather than the industrial function zones (Gaubatz 1999), and make the suburbs become the sub-urban areas like a "growth machine" (Shen and Wu 2013). In this case, the people who come to the suburban areas for work or study temporarily are willing to settle in the new cities, and the people who face high housing price or employment pressure will choose to move to the new cities for a better self-development (Ma and Wu 2013). The local government should put forward to the certain preferential policies to encourage the people, especially the floating population, to live in the new cities, as well as reduce the stress of floating population pouring into the inner city.

The international metropolises are faced with the problem of population decentralization in the period of rapid urbanization and economic growth generally. The population decentralization in Shanghai should not only draw lessons from other developed countries' experience, but also base on its actual development. It is inevitable for Shanghai to put forward a rational planning guidance or urban policies according to the economic laws to optimize population spatial structure and achieve the sustainable population development.

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