The Analysis of Two Increases and Two Reductions Policy of Shanghai

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1 Research on the Background of Two Increases and Two Reductions Policy

Since economic reform, Shanghai, the leading city in the Yangtze River Delta, has attracted a growing number of settlers by dint of its economic strength, economic growth speed and employment prospect (Fig. 1). However, as Fig. 1 shows, with the expansion of agglomeration effect, Shanghai is facing increasingly severe contradictions in population, social and environmental problems.

Shanghai Urban Master Planning (1999–2020) estimates that in 2020, the actual resident population in Shanghai will reach about 16 million, which was however exceeded in 2000. Figure 1 suggests that resident population in Shanghai soared by 1,988,400 from 1999 to 2003. By comparison, registered population showed a slow increase, growing by 286,500 in these 5 years. The major reason for the increase in Shanghai population proved to be the influx of non-native population, the ratio of which to total resident population rose year by year. In 1999, non-native population accounted for about 1/6 of total resident population while nearly 1/4 in 2003. At that time, urban center was overcrowded, and more importantly, non-native population, especially the large quantity of low-income groups, lacked the ability to afford the expensive apartment in Shanghai urban center, thus choosing to buy the apartments at a lower price in the suburbs. As the suburbs became flourishing, the original urban center kept going downhill. The worsening of living environment has capacitated more residents to settle in suburbs, which, as a result, caused the external expansion of built-up areas in Shanghai. Up to 2003, the administrative region had covered an area of 6,340.5 km^2. As Table 1 shows, compared with other

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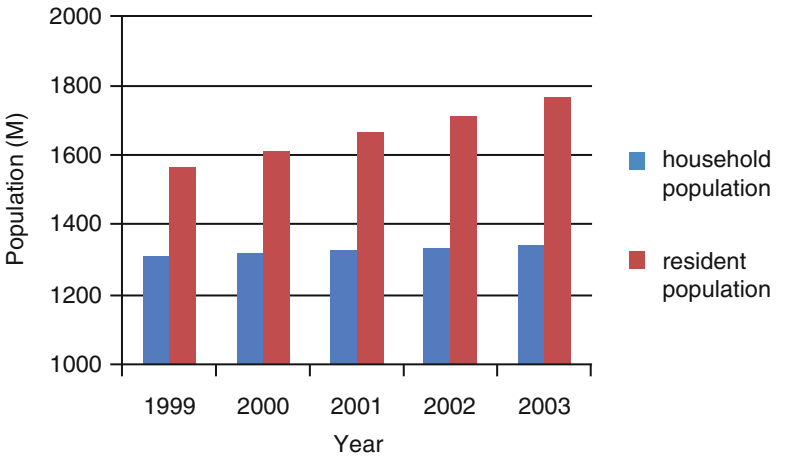

Fig. 1 The population statistics of Shanghai (1999–2003) (Source: The statistical yearbook of Shanghai (2000–2004))

Table 1 The population of cosmopolitan cities and Shanghai in 2003

International metropolis	Land area (km^2)	Population (m)	Population density (in h/km^2)	Statistical time	Scope definition
Shanghai	6,340.5	1,765.847	2,785	2003	Shanghai (16 districts and 1 county)
New York	1,214.4	808.57	6,658	2003	New York city (5 districts)
Tokyo	2,187	1,238.52	5,664	2003	Tokyo metropolitan
Paris	105	214.7	20,370	2003	Paris metropolitan
Hong Kong	1,104.3	673.85	6,102	2003	Hong Kong Island, Kowloon Peninsula, New Territories

Source: The statistical yearbook of Shanghai (2004) and the comparative study on land scale of the international metropolis, Beijing: China Building Industry Press, 2009 [1]

international metropolises, Shanghai held the largest population with the lowest population density in 2003.

Shanghai population faced imbalanced distribution in space. Population density of the inner-ring urban center was much higher than that of outer-ring suburb, and it seemed that the suburb with vast land but small population was still capable of offering sufficient land for development purpose. As a matter of fact, Shanghai has been highly exploited. Based on the comparisons about the proportion of construction land area to urban area, in 2005, the construction land area of Greater London was 1,596.2 km^2, taking up 23.7 % of the gross planning area of Greater London; the construction land area of Ile-de-France reached 2,723 km^2, accounting for about

23.4 % of gross area of Ile-de-France; HK construction land area only constituted 23.4 of gross land area in HK; however, in 2003, Shanghai construction land area represented nearly 30 % of gross urban area [1]. The constant growth of construction land area aimed primarily to cater to people's demand for houses. As population growth went beyond expectation and planning was divorced from practical development, there were a growing number of depressing skyscrapers and outdated supporting service facilities that constantly worsened urban environmental quality. This could be embodied in the comparison of land composition between Shanghai and New York in 2002. Taking green ratio for example, in 2002, entertainment land of New York covered an area of 157.08 km^2 (corresponding to the municipal green land contained in Shanghai construction land), constituting 25 % of total construction land, while Shanghai urban green land covered an area of 187.58 km^2, only representing 8.3 % of total construction land.

On December 3, 2002, Shanghai was granted the right to host World Expo 2010. In the meantime, in a new *Shanghai Urban Master Planning*, Shanghai Government declared that Shanghai would be built as an international metropolis with four centers, including international economic enter, financial center, trade center and shipping center. By dint of this opportunity, Shanghai expected to control population growth and urban expansion in Shanghai and improve urban environment by amending *Shanghai Town Planning Ordinance* published in 1995 as a new policy. Urban environmental reform placed focus on urban center, whose environmental problem was mainly reflected in overhigh floor area ratio, and excessively small open space and green land. Against this backdrop, Shanghai Government put forward *Two Increases and Two Reductions* Policy in 2003.

2 The Proposal of Two Increases and Two Reductions Policy

In October 2003, the fifth Planning Working Conference in Shanghai firstly made clear the thoughts of Two Increases and Two Reductions. Two increases referred to the increases of public green land and public space in urban center, while two reductions meant the reductions of floor area ratio and total building quantity. Regulations of Shanghai Municipality on Urban and Rural Planning published on January 1, 2011 emphasized again that the formulation and implementation of urban center planning should attach importance to the increase of public green land and public space as well as the control of total building quantity and high-rise buildings.

Shanghai government repeatedly stressed that Two Increases and Two Reductions Policy was only applicable to urban center because the problems of overhigh floor area ratio and overmany high-rise buildings were centralized in central city. Additionally, from 2003 to 2011, the specific contents of two reductions were modified from the reduction of floor area ratio and total building quantity to the

control of total building quantity and high-rise buildings, which reflected that the execution of policy faced the problem of rigid uniformity, namely, the universality of policies and standards. The application of control implied that even in urban center, the non-core urban business areas or the major settlements of urban population with overlarge floor area ratio and building quantity should reduce the floor area ratio and building quantity to a larger degree in accordance with the actual condition, but the areas which were of proper or slightly small floor area ratio and building quantity as well as of development potential should maintain or slightly reduce the floor area ratio and building quantity. This would encourage the exploitation and then the development of these areas, and meanwhile, proper control was required besides the focus on development. Since the execution of this policy over 10 years ago, the contents of two increases have kept unchanged. This meant that it was a long-term and tough process from the execution of this policy to the realization of expected objectives, which could not be accomplished overnight.

Two Increases and Two Reductions Policy was executed to heighten the urban environmental quality of Shanghai, control the population growth speed in urban center, alleviate the social contradictions and conflicts, and control urban construction behavior, which was aimed at forging Shanghai as an international metropolis and a livable eco-city. It reflected the planning thought of "organic decentralization, people orientation, ecological priority, and smart growth", which has presented a useful solution for the existing problems in Shanghai urban society [2]. At present, China's urbanization level has surpassed 50 %. What is more, Shanghai has stepped into the post-industrial period, in which urban development has shifted from quantitative change to quality change. As a result, it is inappropriate to measure economic and social development level with GDP as before. Instead, urban construction needs to pay more attention to humanistic care, giving priority to the facilities that can improve people's life quality, which is the function that should be exerted by the Two Increases and Two Reductions Policy. In addition, in order to cope with the population growth which cannot be accurately estimated by means of conventional planning prediction, this policy can be executed to control population growth speed in the hope of mitigating the population pressure on Shanghai.

3 Feasibility Analysis on Two Increases and Two Reductions Policy

As the literal meaning shows, Two Increases and Two Reductions Policy was expected to address the problems concerning land development and environmental improvement. Besides high development intensity analyzed above, Shanghai land utilization status was also characterized by low land benefit. In 2002, Shanghai GDP stood at RMB 624 billion, with construction land GDP reaching RMB 221 million/km^2 [3]. Compared with other Chinese cities, Shanghai took the lead in construction land benefit, whereas it only constituted a fraction compared with

metropolises in developed countries. For example, in 2006, New York created GCP of US $ 47.8 billion, and construction land output value of US $ 772 million/km^2 (RMB 6.15 billion/km^2 based on the exchange rate of US dollar to RMB in 2006), which evidently showed that there was a huge difference in construction land benefit between Shanghai and foreign developed regions. Another characteristic was that the growth speed of total land utilization quantity exceeded land requirements presented by economic growth and population growth. The output value of the secondary and tertiary industries increased by around 47 % from 1999 to 2002, whereas the built-up area by 100 % surprisingly. From the added values of the secondary and tertiary industries created by the every square kilometer of built-up area in 1999, 2000, and 2002, it can be seen that the figure declined from RMB 654 million/km^2 in 1999 to RMB 479 million/km^2, which suggested that since 1999, land utilization of urban built-up area has showed an uneconomical trend, and besides, urban economic growth has become more reliant on the extensive utilization of urban land, with total urban land utilization amount out of the control [3].

In terms of urban environment, in addition to the depressing skyscrapers and insufficient open space, the crowd in urban center, especially CBD section, proved to be one of the problems that resulted in traffic jam and parking difficulty. Two Increases and Two Reductions Policy produced the effects as below: controlling development intensity, tapping the potential of existing construction land, curbing the suburbanization process by comprehensively developing the land to raise the unit output and intensive land application, delivering more open space and green land, controlling the quantity and concentration degree of huge buildings to avoid the jam of pedestrian flow and traffic flow [4]. According to the analysis on the problems of urban development and the expected effect of the policy at that time, Two Increases and Two Reductions Policy was effective.

4 Defects of Two Increases and Two Reductions Policy

Government must make corresponding adjustments with the change of the times and the environment so as to suit the development and reform of the times. Otherwise, the result of policy implementation may go against the intention of policy formulation. Since the formulation and implementation over 10 years ago, Two Increases and Two Reductions Policy has indeed made some achievements. However, as an international metropolis with four centers, Shanghai has kept its population soaring in recent 10 years, which suggests that a growing number of people will settle down in Shanghai in the future, and meanwhile, urban center will still serve as the major carrier of resident population. The central aggregation of such population will be of positive significance for the improvement of urban center's vigor and reinforcement of its core position. On this basis, this policy will be no longer applicable to some regions. For example, core business areas, such as Xujiahui and Lujiazui, should enhance development intensity, attract settlers and raise popularity on the premise of assuring proper public space and green land.

Since full implementation, this policy has not only developed perfect laws and regulations and multilevel planning system, but also worked as the compulsory requirement for Shanghai to formulate regulatory planning. However, its implementation process handled all problems according to single standard without flexibility. Though this policy has defined the applicable scope (urban area) and clearly stipulated the upper limit of floor area ratio (floor area ratio of residence shall be no more than 2.5 and that of office building 4), single standard was still applied in different regions of one central urban area in the planning implementation process. There are eight Central urban districts in Shanghai such as Huangpu, Xujiahui and Changning, which take on different development status with different functional orientations. Thus, future development goals cannot be treated in the same manner. In view of this, Shanghai is expected to combine with local conditions in the future to flexibly handle the relationships among floor area ratio, total building quantity, high-rise building, green ratio, public space and other related factors. Additionally, Shanghai is required not only to encourage core areas to accommodate more population by regulating market supply and land development intensity, but also to improve environmental quality by means of land functional replacement, old town transformation, urban renewal in the backward old towns. Meanwhile, Shanghai needs to control population growth and alleviate the contradictions between the increase of resident population and the insufficiency of supporting service facilities.

Two Increases and Two Reductions Policy was originally intended to reduce floor area ratio and high-rise buildings and then the quantity of the residential buildings and commercial office facilities in central urban districts, which aimed to further dampen excessively rapid population growth by decreasing the resident and employed population. In fact, influenced by other factors, Shanghai keeps a rapid growth in actual resident and employed population every year. However, without corresponding adjustments for land supply policy, the pure reduction of urban land supply will inevitably lead to the tense and contradictory demand-supply relationship and finally the sharp rise of land price. Then, the relocation compensation cost of old towns will increase with land price. In the face of the increased land cost and development cost, real estate developers have to raise housing price. As a consequence, urban residents will be unable to afford the house and forced to settle down in suburbs. This result completely goes against the original intention of Two Increases and Two Reductions Policy.

5 The Implementation of Two Increases and Two Reductions Policy

Since the release of *Two Increases and Two Reductions* Policy in 2003, Shanghai Planning Bureau, coupled with planning bureaus in different districts, has classified the projects left by history. For example, in 2004, central urban districts have sorted out 376 projects left by history, including 326 development projects with high floor ratios, and besides, proper treatment was carried out for not only 4 construction

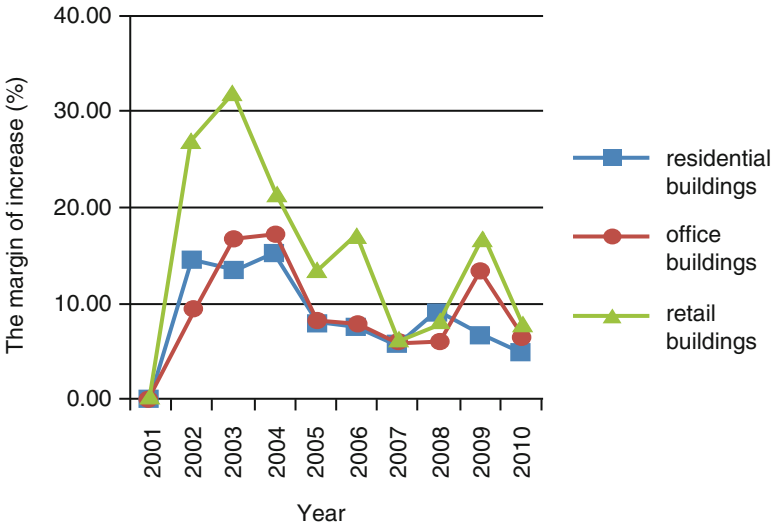

Fig. 2 Variations in categories of Shanghai's land area (2001–2010) (Source: The statistical yearbook of Shanghai (2002–2011))

projects with residential floor area ratio exceeding 2.5 and commercial office floor ratio surpassing 4, but also other construction projects inconsistent with planning requirements. After controlling, adjusting and optimizing development projects with high floor area ratio, the projects substantially decreasing such ratio constituted 85 %, with the total floor area falling by 3,685,000 km^2 and 15.3 % [5]. The figure below shows the increase of residential building area, commercial-residential shop area and office building area from 2001 to 2011.

According to the analysis in Fig. 2, the period from 2003 to 2004 witnessed the growth peak of residential building area, reaching 15.22 %, because the *Two Increases and Two Reductions* Policy was just put into practice without making good achievements. Additionally, this was closely associated with the impact of housing policy reform in 2003 on real estate market. Afterwards, the increase saw a decline from 2004 to 2005 and arrived at 4.84 % in 2010 at the lowest level, which reflected that *Two Increases and Two Reductions* Policy has achieved initial success. The floorage change of office building and store was also largely identical with minor differences. The major difference was that there was a huge increase during 2008 and 2009 because world expo was going to be held, because of which developers and investors increased development efforts.

In the past 10 years, *Two Increases and Two Reductions* Policy has made some achievements, but it was supposed to pay more attention to its disadvantages. In the future, how should this policy develop and improve itself to cater to the requirement of urban construction in new ages? With this question, the author primarily makes an analysis on three aspects including urban design, traffic impact assessment and resilient city.

In urban design, consideration should be given to the important factors, such as urban skyline, landmark building and building size. The changeful urban skyline and magnificent skyscrapers can provide visual shock and enjoyment for urban residents to enhance their identification with the city. Therefore, in the future implementation of this policy, single standard should not be adopted to impose constraints on the building size of construction projects in all blocks of central urban districts. Additionally, under the guidance of integrated urban design elements, all constructed projects need to enrich urban landscape and improve cultural influence. Besides, appropriate policy relaxation is required to attract developers with incentive mechanism of urban design so as to carry out the construction of public service facilities. At the same time, efforts should be spent in forging an intensive and high-dense urban center by increasing floor area ratio as well as height and quantity of high-rise buildings, so as to create central urban landscape with modern characteristics. For the purpose of controlling population and building quantity, the policy can implement dynamic equilibrium for the controlled quantity that is decomposed according to the formulation unit, and besides, the region which is positioned to be with low function should hinder the development with lower floor area ratio and control the quantity of high-rise buildings.

The urban construction activities, such as the renovation of old towns, and the development of new urban land, will be sure to cause the change of regional traffic flow, which will be turned into the important factor that influences commuting. The preliminary formulation of this policy failed to take into account this detail. Thus, full consideration should be given to the implementation, feedback and adjustment of this policy in the future. At present, traffic impact assessment in the countries such as U.S. is always deemed as the project development prerequisite of policy object, with developer inviting tenders from consulting company. Then, the consulting company will submit traffic impact assessment report to local government. If the development project fails to meet the stipulated service standards of traffic facilities, developers must amend their development schemes or assume the construction expense of the traffic facilities with the same influence so as not to impose burdens on periphery traffic facilities [6]. In the future, *Two Increases and Two Reductions* Policy should not consider the upper limit of floor area ratio and the quantity of high-rise buildings as the only factor influencing development intensity. Instead, it is supposed to bring in the traffic impact assessment factors of construction projects, comprehensively analyzing and considering local status, geographical condition, land utilization structure, traffic condition, planning purpose, project's functional orientation, traveling habit of the settled group, road network planning, traffic facility, etc. On this basis, *Two Increases and Two Reductions* Policy needs to present the legal control measures for development intensity based on scientific theory. This aims to ensure that under such development intensity, traffic facilities are able to meet the living and working requirements of residents in good commuting status in local region, without imposing pressures on the traffic facilities of surrounding area.

From the hurricane Katrina in 2005 to Ya'an Earthquake in 2013, it can be seen that traditional cities appear to be vulnerable to major natural disasters. Against this

backdrop, overseas scholars have firstly presented the theory of resilient city. In their view, resilience refers to a system's ability to remove interference and maintain its basic structure and function. That is, when dealing with the external force arising from the changes of various factors, such as natural environment, social factor and political factor, city, society and people show some adaptability and self-resilience ability [7]. To a certain degree, this original intention is consistent with the *Two Increases and Two Reductions* Policy published before presentation of resilient city theory: the increased public space and urban green land can be applied to leisure in daily life. In case of any major natural disaster, they can be automatically turned into the shelter, distribution center of relief materials, place used by relief agency, etc. Meanwhile, the reduction of floor area rate for the purpose of controlling the excessive population growth can also better the operation status of infrastructure system, especially the ultimate load of urban traffic system. Then, in case of any disaster, there will be more flexible dispatching space and available equipment. The coincidence between *Two Increases and Two Reductions* Policy and resilient city theory suggests that in the future, this policy will still become effective. Under the guidance of resilient city theory, there is a need to make clear the objective and significance of increase and reduction, subdivide the scope, project, and quantity index of increase and reduction, which can ultimately contribute to the realization of flexible and healthy urban development, the high-efficient response to emergencies, and the diversified urban living environment.

6 Conclusion

Two Increases and Two Reductions Policy is an attempt made by Shanghai government to address the problems, such as the rapid growth of Shanghai population, and the worsening of urban environmental quality. As the inevitable choice for Shanghai, *Two Increases and Two Reductions* Policy is of far-reaching significance for Shanghai to construct a modern international metropolis and a livable eco-city. However, in combination with various factors, such as practical development of Shanghai, integrated urban design, traffic impact assessment, and resilient city, long-term efforts and explorations still need to be made, so as to scientifically increase and reduce floor area ratio, high-rise building, green ratio and public space and then realize the healthy urban development.

References

1. Shi Y, Zhihong P, Yongjian C (2009) The comparative study on land scale of the international metropolis. China Building Industry Press, Beijing
2. Monographic Conference (2012) The Shanghai municipal planning and land resources Bureau's work conference on the implementation of two increases and two reductions policy. Shanghai Urban Plann 5:71–73

3. Jing Dong (2005) The research on the characteristics of Shanghai land use amounts. In: Proceedings of the international conference on "The urban rational growth and land policy in China"
4. Liu Hui (2012) Shanghai construction land situation analysis and countermeasures of industrial land. Shanghai: Shanghai Land Resources
5. Guorong M (2004) Two increases and two reductions shows its achievements. Shanghai: Shanghai People's Congress Monthly
6. Pan Dongbo, Yangtianyi, Huang Tongyuan (2004) Traffic impact assessment system on urban construction project. J Chongqing Univ 2004(07):75–77
7. Jianming C, Hua G, Degeng W (2012) Studies on foreign resilient city. Progress Geogr 2012 (10):1245–1255