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Danlin Yu

# China's New Urbanization

## Developmental Paths, Blueprints and Patterns

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# Preface

After 63 years of rather tortuous development process, urbanization in China has entered a period of rapid development. In the meantime, the nation is entering a critical period of restructuring for urbanization. This specifically embodies in the following aspects. China now has over 50 % of its vast population living in the cities. The so-called urban diseases problem becomes a significant issue in urban planning and urban development, which calls for a transition from old views/practices to a "new" mind-set. China's urbanization often gave inadequate consideration for preserving the environment and resources, which leads to unsustainable development. Moreover, this is also the key time for balances among urbanization, industrialization, modernization of agriculture, and information technology development.

Scholars argue that the fate of China's urbanization might very well determine not just the future of China's urbanization, but the global urbanization as well. As a matter of fact, Dr. Stiglitz, the 2001 Nobel Prize Laureate stated that there will be two most important events that will have significant impact on the development of human society. The first is the new technology revolution led by the USA, and the second is China's urbanization. Realizing the importance of a sustainable urbanization in China, in the Chinese Communist Party's (CCP) "Eighteenth Party Congress," Central Work Conference of Urbanization and Central Economic Work Conference, the Chinese government started to promote the concept of New Urbanization, which focuses primarily on the quality instead of quantity of urbanization and stresses urban sustainability. The promoted concept of New Urbanization incorporates the principles and ideas of ecological civilization and is characterized by compactness, intelligence, and green and low carbon. The promotion of New Urbanization is not only a sustainable response to China's traditional urbanization, but also a step forward contributing to the global sustainability. More importantly, under the current developmental background, promoting New Urbanization is also a critical approach to extend domestic demand. Some even argue that the successful implementation of New Urbanization might provide potential solutions for a series of economic and societal issues China is now facing,

such as the compound issue of urban diseases, underemployment, and environmental/ecological degradation in both urban and rural regions. In this regard, it is critical and imperative for us to reexamine the developmental stages and status, and promote necessary strategies to facilitate the transition to the New Urbanization in China. To address these important strategic issues, we intend to publish the monograph *China's New Urbanization—Developmental Paths, Blueprints and Patterns*.

The monograph is the fourth report after *Report of China's Urbanization Process and Resources and Environment Security* (Science Press, 2009), *Report of China's Urban Agglomeration Development* (Science Press, 2011), and *Report of China's Creative Urban Development* (Science Press, 2013). The monograph collects the strategic thinking and empirical experiences done by our team during the past five years. The study is sponsored by the Major Project of National Natural Science Foundation of China "Coupled mechanism and interactive coercing effects between urbanization and eco-environment in mega-urban agglomerations" (No. 41590840, 41590842) and the National Social Science Major Project Grant "Studies of China's Urban Spatial Pattern Optimization under New Urbanization" (Grant Number 13&ZD027).

Guided by the CCP's "the 18th CCP National congress" and Central Work Conference of Urbanization, this monograph takes advantage of the historical opportunity that China is implementing New Urbanization to study and analyze the development stages, status, bottleneck, and outstanding issues of China's New Urbanization. Based on the development trajectory of China's urbanization during the past 60 plus years, we promote strategic thoughts, directions, fundamental guidelines, and implementing approaches for China's New Urbanization. In addition, we studied and presented the general mode, differential mode, gradual mode, and the new pyramidal spatial organization pattern of transitioning from traditional to New Urbanization in China. On top of that, we also explored the comprehensive regionalization plans for China's New Urbanization and approaches to promote urbanization quality in China.

The monograph is divided into six chapters. Chapter 1 deals with China's New Urbanization Development Status and Bottlenecks. Chapter 2 explores the developmental strategies and fundamental guidelines for China's New Urbanization. Chapter 3 discusses the basic modes for China's New Urbanization. Chapter 4 presents the new spatial pattern of China's New Urbanization development. Chapter 5 outlines the comprehensive regionalization plans for China's New Urbanization. Chapter 6 details the urbanization quality and approaches to promote such quality for China's New Urbanization.

The monograph is never a product of the authors alone. During the writing process, we are fortunate to have the support and guidance of Professor Ye Danian (Academician of the Chinese Academy of Sciences), Professor Guo Huadong (Academician of the Chinese Academy of Sciences), Professor Mao Hanying (Academician of the International Eurasian Academy of Sciences), professors Liu Shenhe, Huang Jinchuang, Bao Chao, Ma Haitao, Zhang Qiang, and Wang Zhenbo. In addition, postdoctoral scholars Li Jing, Zhang Xiaorui, and Wang Qian, and

doctoral students Liu Xiaoli, Zhang Jian, Wang Yang, Wu Kang, Wang Yan, Li Guangdong, Qin Jing, Qiu Ling, Wu Fenglin, Guan Xinliang, Liu Qi, Wang Shaojian, Liu Qiuyin, Pang Bo, Zhang Yongjiao, Su Wensong, Zhao Yabo, Liang Hanmei, Luo Kui, and Zhao Jie have facilitated data collection, analysis, and cartographic design and editing. The bureau chief Zhu Haiyan of the Resources and Environment Branch of Science Press and editor Li Qiuyan have given great assistance and support in the process of publication of this report. We cannot thank everyone enough for their dedication and efforts.

Though there is a broad consensus regarding the strategic importance for the development of New Urbanization in China, opinions regarding some of the hot issues such as the connotation and implementation paths for New Urbanization have yet to reach a consensus. Different opinions exist widely in the academic, political, and media communities. Some views and opinions presented in the current monograph could be biased or incomplete. In addition, due to time constraints and our own capacity, there bound to be issues that are worth debating, and any discussions are more than welcome. Though we have carefully credited every source we cited in the writing process, any omission is not intentional and we would welcome any criticism and suggestive comments. We sincerely hope the readers of the book would provide their valuable advices! We hope the book provides scientific and theoretical basis for China's efforts to promote the New Urbanization. We hope we can work together for the healthy and stable development of China's New Urbanization!

Beijing Chuanglin Fang
March 2015

# Acknowledgments

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In recent years, Dr. Fang has mainly engaged in the research and teaching of urban geography, urbanization, and city planning. Dr. Fang has conducted in-depth studies in different types and at different spatial scales of China's Urban Master Planning, detailed urban regulatory planning and industrial agglomeration planning, sustainable development of China's urban agglomeration, China's urbanization process and resources and environment security, and urbanization and its relevant ecological effects. He has served as principal investigator in over 100 awarded national and regional grants, including Major Projects of the National Social Science Foundation, Key Projects of the National Natural Science Foundation of China, Major Project of the Ministry of Science's "Eleventh Five-Year" Science and Technological Support Plan, National 973 project, Planning Projects of the National Development and Reform Commission's "Eleventh and Twelfth Five-Year Plan," Project of the State Environmental Protection Department's "Twelfth Five-Year" Plan, Research Project of the National "Ninth Five-Year Plan," Major Project of the Three Gorges Construction Committee under the State Council, the EU Regional Policy Project, the Asian Development Bank Project, the National Development Bank Project, Major Project of the Chinese Academy of Sciences Knowledge Innovative Engineering, and local government commissioned urban planning, industrial planning, and regional planning projects. Since 2003, Dr. Fang has submitted 45 important advisory reports to the Central Office and the State Council Office, of which 20 have been personally read and commented by the President, Prime Minster and Vice Prime Minister and other party and state leaders. Two of them have become the State Department documents. Dr. Fang has edited and published over 20 monographs, including "China's New Urbanization Development Report," "China's Urbanization Process and the Protection of Resources and Environment Report," "China Urban Agglomeration Development

Report," "China Innovative Urban Development Report," "Theories and Practices of Sustainable Development of China's Urban Agglomerations," "China's Urban Industrial Layout Analysis and Decision Support Systems," and "Urbanization Process and Eco-environmental Effects." He also served as associate editors for seven other books. Dr. Fang has published over 330 journal articles with 40 of them in journals indexed by SCI/SSCI, and 20 of them indexed by EI. Dr. Fang has also led the development of 20 software packages related to China's urban agglomeration, urbanization, and urban industrial development layout decision support systems, all of which have received national computer software copyright registration. Dr. Fang has now 6 patents. Dr. Fang has won the International Geographical Union's Outstanding Young Scientists Award, the State Council Three Gorges Migrants Project Research Outstanding Achievements Award, China Youth Geographical Science and Technology Award, Chinese Academy of Sciences Outstanding Technical Achievement Award, Chinese Academy of Sciences Local Cooperation Award (first tier), Scientific and Technological Progress Award (first tier) of Xinjiang, Chinese Academy of Sciences Award for Outstanding Graduate Tutor, and Chinese Academy of Sciences Zhu Li Yuehua Outstanding Teacher Award.

**Dr. Danlin Yu** obtained his Ph.D. in geography from the University of Wisconsin–Milwaukee in 2005. He is currently a tenured associate professor of urban geography and GIS at Montclair State University. Dr. Yu's main research areas include urban and regional development planning, spatial data analysis, geographic information science and technology, geocomputation, simulation of complex systems, big data mining and analysis, and their applications in human and natural systems. So far, Dr. Yu has published more than 60 journal articles/book chapters in these areas in both Chinese and English, and among them, more than 40 papers are published in SCI/SSCI-indexed journals. Dr. Yu's research in these areas has gained domestic and international influences. Dr. Yu has been actively using R language to write freely available spatial data analysis software packages. He is one of the coauthors of the SPGWR package that is for geographically weighted regression analysis. The package has already received a wide range of applications in the world. Since 2008, Dr. Yu was invited by the Georgia National Science Foundation as international evaluation experts. Dr. Yu currently serves as an associate editor for the Journal of Urban Planning and Development since 2012. From 2013 onward, Dr. Yu was awarded the "Tianshan Scholar" title by the Xinjiang Uyghur Autonomous Region and housed in Xinjiang University.

# Chapter 1
# China's New Urbanization and Development Bottlenecks

After 63 years of rather complex development process, urbanization in China has entered a period of rapid development. In the meantime, the nation is entering a critical period of restructuring for urbanization. This specifically embodies in the following aspects. China now has over 50 % of its vast population living in the cities. The so-called "urban diseases" problem becomes a significant issue in urban planning and urban development, which calls for a transition from old views/practices to a "new" mindset. China's urbanization often gave inadequate consideration for preserving the environment and resources, which leads to unsustainable development. Moreover, this is also the key time for balances among urbanization, industrialization, modernization of agriculture, and information technology development.

Scholars argue that the fate of China's urbanization might very well determine not just the future of China's urbanization, but the global urbanization as well [1]. As a matter of fact, Dr. Stiglitz, the 2001 Nobel Prize Laureate stated that there will be two most important events that will have significant impacts on the development of human society. The first is the new technology revolution led by the United States; and the second is China's urbanization. Realizing the importance of a sustainable urbanization in China, the Chinese government started to promote the concept of New Urbanization, which focuses primarily on the quality instead of quantity of urbanization, and stresses urban sustainability. The promoted concept of New Urbanization incorporates the principles and ideas of ecological civilization and is characterized by compactness, intelligence, green and low carbon [2]. The promotion of New Urbanization is not only a sustainable response to China's traditional urbanization, but also a step forward contributing to the global sustainability. More importantly, under the current developmental background, promoting New Urbanization is also a critical approach to extend domestic demand. Some even argue that the successful implementation of New Urbanization might provide potential solutions for a series of economic and societal issues China is now facing, such as the compound issue of urban diseases, underemployment, and environmental/ecological degradation in both urban and rural regions. For this



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regard, it is crucial and necessary for us to reexamine the developmental stages and status, and promote necessary strategies to facilitate the transition to the New Urbanization in China.

## 1.1 Stages of China's Urbanization

### *1.1.1 Change of View of China's Urbanization from Three-Stage to Four-Stage*

After careful studies of the stages of urbanization in various countries, in 1975, Ray M. Northam summarized that the progress of urbanization could be represented as a slightly stretched "S" curve [3], and demarcated the three stages of urbanization based on urbanization levels (measured as the percentage of the population living in cities). The initial stage is when urbanization is less than 30 %, in which the cities are gradually growing and population starts to accumulate in cities. The trend will continue to the middle stage when urbanization level is between 30 and 70 %, yet the rate of population moving into the cities is much faster. After urbanization level reaches 70 %, the rate of urbanization will gradually slow down and stabilize. The three stages correspond roughly with the initial, middle and post stages of industrialization. The elegant theoretical summation of urbanization and its link with industrialization gives fairly reasonable accounts for population dynamics, career organization, industrial structure, and urbanization levels, especially in the later 1970s to the early 1990s. The three-stage theory, though aligns well with the three stages of industrialization, falls short to agree with the four stages of economic development. In particular, the second stage of the three stages seems to be unnecessarily long comparing to the other two. By splitting the second stage into two stages, and matching each stage with the four stages of economic development, then we have a four-stage urbanization theory, or a modified Northam Urbanization *S* curve. In particular, the first stage of urbanization, corresponding to the initial stage of economic development, is when urbanization level is less than 30 %, characterized as slow yet steady growing of population in the cities. The middle stage is when urbanization level is between 30 and 60 %. We term it the growing stage. This stage is characterized with rather rapid population increase and high economic growth rates. In the third stage, when urbanization level is between 60 and 80 %, the cities enter a relatively mature and stable status. Economic growth and development rate start to slow down. Though population continues to incerease to slow down. Though population continues to increase in cities, the increasing rate is much lower than the previous stage. The last stage of urbanization, we termed the terminal stage of urbanization, is when there are more than 80 % of the population living in cities. Economic growth and development remain dynamically stable. Growth rate is low or even none, and the economy is dominated by information and high-end service-oriented industrials [4]. A summary of the four stage urbanization

and various characteristics corresponding to each stage is presented in Table 1.1 and Fig. 1.1. We briefly discuss the characteristics of each stage of urbanization below.

#### 1.1.1.1 The First Stage: Initial Stage of Urbanization with Slow Growth Rate

The first stage of urbanization is roughly during the same period of initial industrialization and economic growth and development. This stage is characterized with slow but steady growth for cities, economic scales, and the industries. In this stage, the rate for urbanization is fairly low, often less than 1 % annually. The majority of population still lives in the rural areas. The economic structure is heavily skewed towards the primary economy (agriculture), which usually account for over 70 % of the region's economic activities. Over half of the population is employed in the agricultural section, and industry account for only less than 30 % of the region's GDP. In this stage, industrialization is the primary driving force for urbanization. The number of cities as well as the size of the cities is limited. Cities distributed sporadically as points in the vast regions.

#### 1.1.1.2 The Second Stage: Rapid Urbanization and Population Increase

This stage corresponds roughly to the middle stage of industrialization and the growing stage in economic development. In this stage, population, economy as well as the size of cities is all growing in a rather rapid rate. Urbanization grows at a rate of 1–2 % annually. There are more people living in the cities than the rural areas. Industrial sectors start to dominate the economy (30–70 %) while agriculture accounts for less than 30 % of the economy. Industrialization is still the primary force for urbanization, but the rapid development of the tertiary section (service section) emerges to be another driving force. Number of cities increases rapidly in this stage, while large and megacities start to appear. The spatial pattern of cities gradually changes from sporadic points to continuous "bands" or even "planes" structure.

#### 1.1.1.3 The Third Stage: The Mature Stage of Urbanization

This stage corresponds to the later industrialization stage and mature stage of economic growth. Urbanization enters a slowing down phase (rate between 0.5 and 1 % annually). Urbanization level gradually increases to between 60 and 80 %. In this stage, urban population and industrial section become overwhelmingly dominant. Agriculture section continues to decrease to be less than 20 % of the economy. In the meantime, the importance of industrial (secondary) section starts to decline in the economy, while the information and service section (tertiary), which now

**Table 1.1** Comparison of the basic characteristics of urbanization's four stages

| Stages of urbanization | The first stage | The second stage | The third stage | The fourth stage |
|---|---|---|---|---|
| | Initial stage of urbanization | Middle stage of urbanization | Mature stage of urbanization | Terminal stage of urbanization |
| Urbanization level/% | 1–30 | 30–60 | 60–80 | 80–100 |
| Industrial level/% | 1–30 | 30–70 | 70–30 | <30 |
| Industrial structure (primary: secondary:tertiary) | 50:25:25 | 25:45:30 | 15:40:45 | 10:30:60 |
| Employment structure (primary:secondary:tertiary) | 80:15:5 | 50:30:20 | 20:40:40 | 10:30:60 |
| Urbanization rate/% | Slow, <1.0 | Accelerating > 1.0 | Slow down, <1.0 | Stabilized, ≈0 |
| Economic growth rate/% | Slow | Fast | Slow down | Stabilized |
| Drive for urbanization | Industrialization dominant | Industrialization dominant, with tertiary industry supplements | Tertiary industry dominant, with industrialization supplements | Tertiary industry dominant |
| Dominant economic type | Agricultural economy | Industrial economy | Industrial/commercial economy | Service-oriented economy |
| Urban spatial pattern | Point structure | Band or plane structure | Network structure | Balanced network structure |
| Rate of urbanization | Low rate | High rate | High rate but slowing down | Zero rate |
| Economic development stages | Initial stage of industrialization | Middle stage of industrialization | Later stage of industrialization | Post-industrialization |
| Economic growth stages | Taking-off stage | Growing stage | Maturing stage | Top stage |

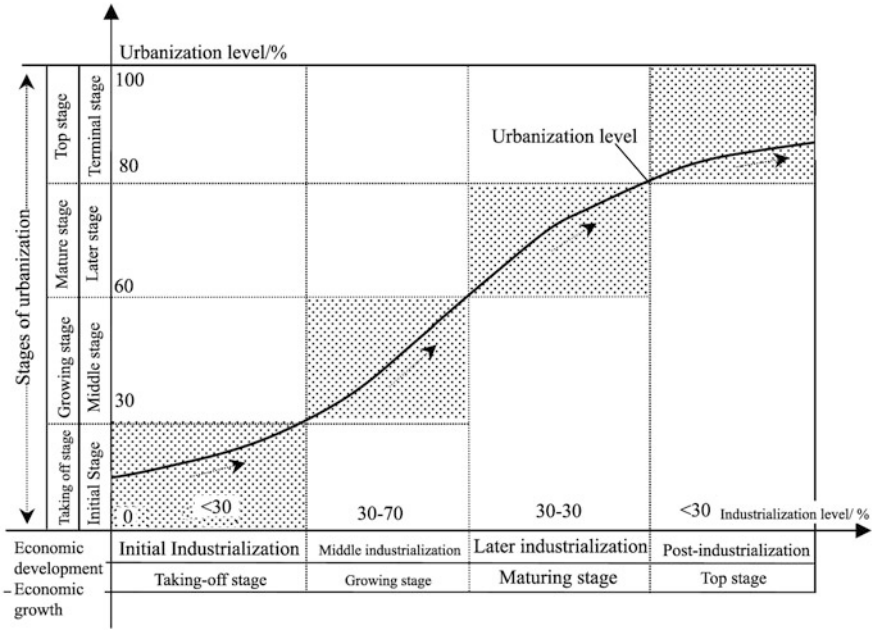


**Fig. 1.1** Illustration of the corresponding stages between urbanization

accounts for 35–45 % in the economy, becomes the primary force driving urbanization. The number of cities as well as their scale continues to increase. The spatial pattern now appears to be more like a network instead of separated bands and planes.

#### 1.1.1.4 The Fourth Stage: The Stable Terminal Stage of Urbanization

This stage again corresponds to the post-industry stage and the top stage of economic growth. Urbanization level reaches between 80 and 100 % (almost everyone lives in cities now). This stage is often characterized as being stable or even stagnant in that the growth rate of urbanization (as well as economic growth) is close to zero. Since the majority of the population now lives in the cities, the difference between cities and the rural areas starts to diminish. Urbanization might even be countered by suburbanization or even exurbanization. The primary section (the agricultural section) now accounts for very little (less than 10 %, but must remain above 5 % to ensure food security) in the economy. So is the decreasing industrial (second) section, which now accounts for less than 30 % of the economy. The tertiary section now accounts for more than 60 % of the economy, and becomes an inseparable agent for urbanization. The spatial pattern of cities is now a rather balanced hierarchical network structure.

### 1.1.2 Urbanization in China Experiences Faster than World's Average Development

As with any other countries in the world, urbanization in China follows closely the four-stage model detailed above. Different from countries in Latin-America, urbanization in China is often heavily influenced by national policy, economic system and industrialization levels. As such, urbanization in China expresses even more stage-like characteristics. Based on data from 1949 to 2012, we see a clear distinction in 1995 when China finally moved into the middle stage of urbanization, after 47 years of initial stage of urbanization (mainly due to the government enforced household registration system). After almost two decades of development, urbanization in China is still in the rapid growing middle stage (second stage, see Fig. 1.2).

From Fig. 1.2, it is obvious that the overall urbanization level in China is increasing, and it does have rather distinctive stage-like patterns. As a matter of fact, the changing curve of China's urbanization during the past 60 plus years is a distinctive reflection of China's socioeconomic development, household registration system, migration policies, organizational standards of towns and municipalities, strategic guidelines for urbanization, and population census and data organization [5]. Based on this curve and the indicators used to demarcate stages of urbanization, we argue that there are two primary stages for China's urbanization, namely, the initial stage (1949–1995), and the middle stage (from 1996 to now). We will discuss these two stages of China's urbanization in details below.

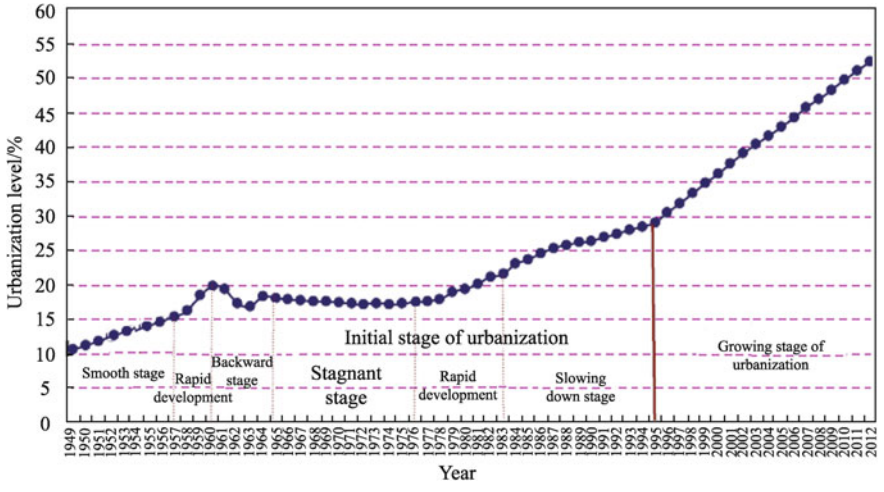


**Fig. 1.2** Urbanization stages in China from 1949 to 2012

#### 1.1.2.1 The Initial Stage of Urbanization (1949–1995)

Based on the four-state theory of urbanization, the nation (region) is in initial stage of urbanization when the urbanization level is less than 30 %. From the official statistics, urbanization level in China was 10.64 % in 1949. It reached 20.16 % in 1981, and 29.04 % in 1995. It exceeded 30 % in 1996 (30.48 %). Hence we deem the entire 47 years from the establishment of the People's Republic of China (PRC) until 1995 as the initial stage of urbanization in China.

Needless to say, China staying almost half a century in the initial stage of urbanization is a combined result of the then national politics, economic system, societal turmoil and relevant policies (especially urban and rural development policies). Urbanization in China during this period was characterized by high volatility, depression, stagnation, back-and-forth, and low-speed, experiencing unprecedented long and complex development process. If, however, we delve further into this lengthy and complex process of urbanization in China, we could still subdivide the initial stage into six sub-stages, which provides a more detailed and accurate image of China's urbanization in this unusually long initial stage. The first sub stage is from 1949 to 1957 when urbanization level reached 15.39 %, which could be termed as a "normal initiation stage" when urbanization started from a rather low level (10.64 %) but developed as expected. The fast urbanization period is from 1958 to 1960 when urbanization jumped to 19.75 % due to relaxed rural-urban migration policies and national policy for promoting industrialization. The retrogressive stage was from 1961 to 1965 when urbanization level dropped to 17.98 % due to the national policies to balance between large inundation of rural migration and the lagging urban infrastructure. Urbanization stagnated at 17.44 % during the "cultural revolution" period (1966–1976) when the entire nation was experiencing a tremendous social turmoil. The end of the "cultural revolution" and the beginning of China's economic reform in the later 1970s to the early 1980s (1977–1983) witnessed a boost of almost every aspect in China's social and economic development. Urbanization level also increased to 21.62 %. It slowed down a little for the next decade (1984–1995) and reached 29.04 % in 1995 when China was adjusting and adapting to the new market economy.

#### 1.1.2.2 The Middle Stage of Urbanization (Since 1996): Grows Steadily and Exceeds World's Average

1996 marked the year when China's urbanization level first exceeded 30 % and entered the middle stage of urbanization per the four-stage theory. The relatively smooth and successful transition from a previously planned economy to the market economy enabled China's cities to become hot spots for socioeconomic development. This is especially true in 2000 when the central government altered the urbanization polices from "strictly control city sizes, especially large and big cities, but reasonably develop medium and small sized cities" in 1989 to encourage a "coordinated development" among large, medium, small sized cities and townships.

The goals of the New Urbanization policies were to boost economic development in the rural area and gradually eliminate the legacy dual (urban–rural) socioeconomic structure due to the planned economy. Developing and improving the infrastructure and carrying capacity of medium and small-sized cities and townships became of particular importance since they could serve as the primary destinations for expected large inundation of rural migrants in the foreseeable future. The government was very keen to reform policies and system barriers that might prevent this coordinated urbanization effort. In the 16th Congress Report, the concept of "diversified and coordinated urbanization" was proposed. It was further clarified that "the Chinese-characterized urbanization must gradually improve urbanization level and insist on the coordinated development among large, medium, small-sized cities and townships. The current county level cities and towns shall be the primary focuses and destinations for encouraging urbanization. The development must follow scientific planning strategies and have a rational and strategic spatial distribution." In the Outline of the Eleventh Five-Year Planning of National Socioeconomic Development (the Outline henceforth), the concept and framework of New Urbanization based on coordination and harmonization started to emerge. Specifically, the Outline indicated that "urbanization must follow an ordered and sustainable path, and insist on coordinated development among large, medium and small-sized cities and townships. The primary purposes of urbanization are to improve cities' carrying capacity, gradually eliminate the urban-rural dual socioeconomic structure in China based on the principles of step-by-step and intensive development, land preservation, and rational distribution." "Urban agglomeration will become the primary form for urbanization in China. The spatial pattern of China's urbanization will be highly coordinated and sustainable, with a few large urban agglomerations as the principal nodes, other sized cities and townships distributed in an orderly and rational pattern, and permanent cultivated lands and ecological function areas in between." In September 2012, the 18th Congress Report and Central Government's Economic Working Conference further stressed that China needs to firmly and steadily promote urbanization, focusing on improving the quality of urbanization in which the principles of ecological civilization and sustainability are inherently embedded. China's urbanization (the New Urbanization) must follow an intensive, intelligent, green and low-carbon path. All in all, China's rapid urbanization in this particular period reflects the combined effects of the full-bloomed socioeconomic development in China, a steady national policy promoting urbanization, and the relatively successfully economic system reform.

By 2012, the official statistics indicated that China's urbanization level reached 52.6 %, which was slightly over the global average in 2011 (52 %). Considering the rate of China's urbanization is almost 1 % more than the world's average, it is foreseeable the China's urbanization level will further increase rapidly. The policies emphasizing rational and sustainable urbanization will also encourage more sustainable and higher quality of urbanization in the future [6].

## 1.2 Overall Evaluation of China's Urbanization

From a sustainable development perspective, to assess whether or not a nation's urbanization is rational and healthy is to see whether or not the progress of urbanization agrees with the nation's industrialization and economic development level, the cities' public service capability, resources and environmental carrying capacity, employment level, and construction of new rural areas [7]. From 1953 to 2013, China's policies regarding urbanization experienced quite a few times of adjustment and transition. Specifically, in the First Five-Year Plan, urbanization was driven by various new construction projects, and developed quite freely. In the Second Five-Year Plan, urbanization experienced fairly chaotic development due to conflicting urbanization policies. During the Third and Fourth Five-Year Plans, urbanization basically stagnated because of the unprecedented societal turmoil (the Cultural Revolution). The Fifth Five Year Plan marked the reform and recovery of rational urbanization. In the Sixth Five Year Plan, urbanization policies based on "controlling large cities, but encourage small cities and urbanizing rural regions" were promoted. During the Seventh and Eighth Five Year Plans, though "controlling large cities" remained in effect, a diversified urbanization route was proposed. In the Ninth Five Year Plan, the concept of a healthy urbanization started to attract governmental and scholarly attention. In the Tenth Five Year Plan, coordinated development was added to the previous ideas, and the frameworks of New Urbanization gradually emerged. In the Eleventh and Twelfth Five Year Plans, urbanization that takes into consideration China's specific socioeconomic background and the ideas of active but stable urbanization were further embedded to the New Urbanization. The path of China's urbanization is by no means a typical one that follows any prescribed theories. During the past three decades, however, it gradually became more diversified, coordinated, and rational.

### *1.2.1 China's Urbanization Is Sub-healthy, "Urban Diseases" Prevail*

Although urbanization in China during the past 63 years went through a fairly complex path, the general trend followed closely the "S" curve, like most of the countries in the world. The initial stage of China's urbanization took 47 years due to various political, societal, and economic reasons. By 2010, however, China's urbanization level reached 47.6 %, which was very close to urbanization levels in the medium income nations. It is forecasted that by 2025, China's urbanization level will reach 60 % (60 % of the population lives in cities), hence entering the mature stage of urbanization (Fig. 1.3). China will then become a true urban society, though still falls far behind the urbanization levels in the developed countries. The unique social, economic, cultural and historical characteristics of China suggest that urbanization in China will not be able to reach that of the

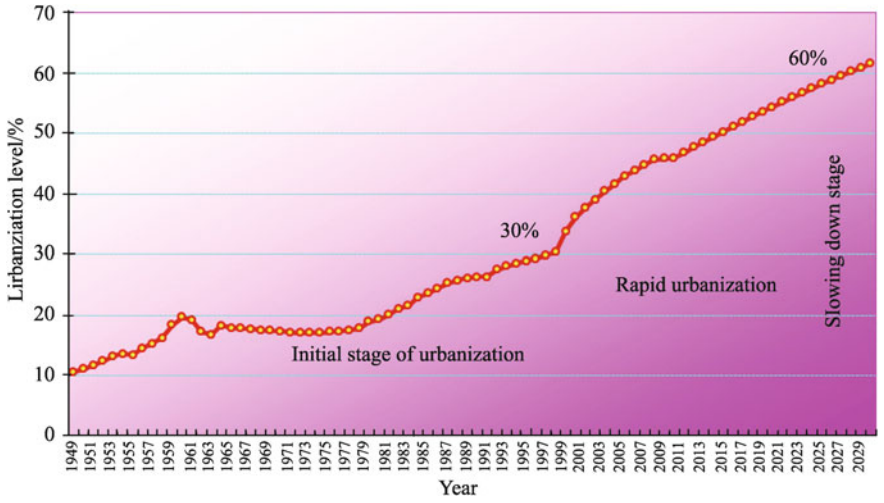


**Fig. 1.3** China's urbanization stages and future development

developed countries in the relatively short term, which shall not be the goal of China's urbanization, either.

More importantly, from the literature and our previous studies, China's current urbanization is more of a sub-health status than a sustainable one. There are 7 primary manifestations indicating the sub-healthiness of urbanization in China, i.e., it is mainly "calculated" (a number's game), driven by "comparison" (to achieve political goals), highly "consuming" (involves tremendous amount of material consumption), highly "polluted" (air, water, and soil quality degraded drastically), often involving "massive demolishing" (demolish old buildings for newer ones often without much consideration of the integrity of urban layout and local residents compensation demands), "crowded," and "forced" [8] (Fig. 1.4). We'll discuss these 7 manifestations in details below.

#### 1.2.1.1 A "Calculated" Urbanization

After the establishment of the People's Republic of China in 1949, China has conducted six different population censuses (1953, 1964, 1982, 1990, 2000 and 2010). In each census, the standards for determining urban and rural population were rather different from one another. In some censuses, urbanization was calculated based on non-agricultural population, but on city dwellers alone in some other censuses. Still in some other instances, the non-city dwellers who have lived in the same city for more than 1 year (some cities use more than half a year) will also be counted as urban population hence enter into the calculation of urbanization. The lack of a uniform standard makes the results of urbanization fairly different based on different standards. More often than not, the calculated results tend to be

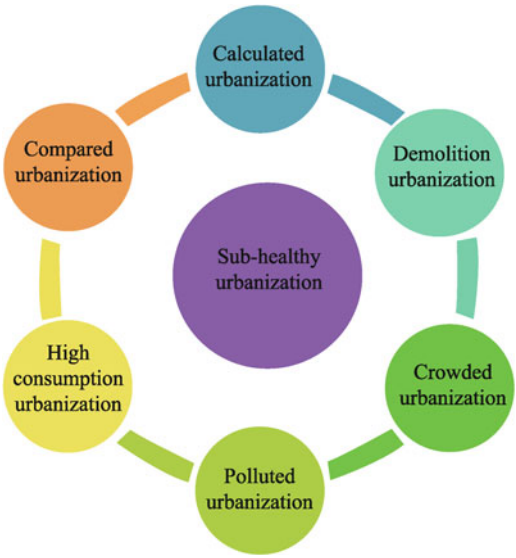


**Fig. 1.4** The sub-healthiness of China's urbanization

higher than the actual levels. In the most recent census (the sixth census in 2010), there were 665,575,306 people living in non-rural lands (the demarcation between rural and non-rural land use is determined using the National Bureau of Statistics' 2008 *Provision of Urban and Rural Divide in Statistics*). Using this number, urbanization level in China was actually 49.68 % by the end of 2010, which is more than 2 % of the urbanization level announced by the National Bureau of Statistics (47.6 %). The dilemma indicates that over 26 million people can't be determined whether they live in the cities or in the rural villages. In 2011, the *China Statistical Abstract* published by the National Bureau of Statistics adjusted the 2010 urbanization level in China to be 49.95 %, while in the same time the level of urbanization reached 51.27 % in 2011, and again to 54.6 % in 2014 (Table 1.2), making China an "urbanized society," at least by numbers. How reliable such numbers are, however, is a golden question that can't be answered due to the chaotic standards used by various agencies. The fundamental reason behind such chaos is a typical legacy of the planned economy that "higher numbers mean higher possible allocation of resources from the central government where all the resources are concentrated." Apparently such "calculated" urbanization will provide little if at all guidance for sustainable urbanization and urban plan.

#### 1.2.1.2 An Urbanization Driven by "Comparison"

Another legacy from the period of planned economy is that higher rank (like higher numbers) often indicates more allocated resources as well, especially if the comparison was made with the developed economies. Comparison and ranking of

**Table 1.2** China's urbanization level from 1949 to 2013

| Year | Urbanization level/% | Year | Urbanization level/% | Year | Urbanization level/% |
|---|---|---|---|---|---|
| 1949 | 10.64 | 1971 | 17.26 | 1993 | 27.99 |
| 1950 | 11.18 | 1972 | 17.13 | 1994 | 28.51 |
| 1951 | 11.78 | 1973 | 17.20 | 1995 | 29.04 |
| 1952 | 12.46 | 1974 | 17.16 | 1996 | 30.48 |
| 1953 | 13.31 | 1975 | 17.34 | 1997 | 31.91 |
| 1954 | 13.69 | 1976 | 17.44 | 1998 | 33.35 |
| 1955 | 13.48 | 1977 | 17.55 | 1999 | 34.78 |
| 1956 | 14.62 | 1978 | 17.92 | 2000 | 36.22 |
| 1957 | 15.39 | 1979 | 18.96 | 2001 | 37.66 |
| 1958 | 16.25 | 1980 | 19.39 | 2002 | 39.09 |
| 1959 | 18.41 | 1981 | 20.16 | 2003 | 40.53 |
| 1960 | 19.75 | 1982 | 21.13 | 2004 | 41.76 |
| 1961 | 19.29 | 1983 | 21.62 | 2005 | 42.99 |
| 1962 | 17.33 | 1984 | 23.01 | 2006 | 43.90/44.34 |
| 1963 | 16.84 | 1985 | 23.71 | 2007 | 44.90/45.89 |
| 1964 | 18.37 | 1986 | 24.52 | 2008 | 45.8/46.99 |
| 1965 | 17.98 | 1987 | 25.32 | 2009 | 46.5/48.34 |
| 1966 | 17.86 | 1988 | 25.81 | 2010 | 47.80/49.6/49.95 |
| 1967 | 17.74 | 1989 | 26.21 | 2011 | 51.27 |
| 1968 | 17.62 | 1990 | 26.41 | 2012 | 52.6 |
| 1969 | 17.50 | 1991 | 26.94 | 2013 | 53.7 |
| 1970 | 17.38 | 1992 | 27.46 | | |

urbanization became a common practice by local governments (which also explains partially why calculating urbanization tend to generate over-estimation). Apparently, such practices tend to yield inflated urbanization levels which could even be harmful to a sustainable urbanization in China. We outline two primary reasons as follows:

First, it is not feasible to compare urbanization level in China with that in the European and American countries (developed or developing countries alike). The specific cultural, historical, societal and economic characteristics of China render the comparison between China's urbanization and any of the countries in Europe and America a rather fruitless action. As a matter of fact, although China experienced a relatively rapid urbanization process, and urbanization level reached about the same as the global average (52.9 % in 2011, see Fig. 1.5) in 2012, urbanization quality lags far behind those of the developed nations in Europe and America. Simple comparison between the numbers (urbanization level that is based on the amount of city dwellers vs. non-city dwellers) would be rather misleading. Moreover, one of the primary reasons for comparison is to reach and surpass the target level than anything else. From the International Statistic Yearbook (2009–2012), however, it's easy to calculated that in 2011, China's urbanization level is

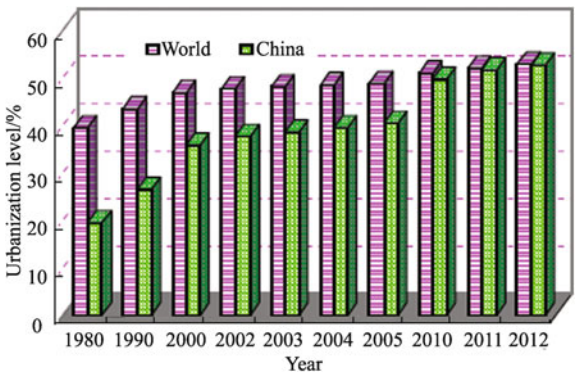


**Fig. 1.5** Urbanization level in China and the world average. *Source* 1981–2013 China's statistical yearbooks, and World Bank WDI database

only 57.1 % of that of the UK's, 62.6 % of the United States', 57.8 % of Australia's, 62.1 % of Korea's, 56.2 % of Israel's, 63.9 % of Canada's, 65.6 % of France's, 68.1 % of German's, 69.9 % of Russia's and 74.1 % of Japan's (Table 1.3, Fig. 1.6). Even with the relatively rapid urbanization rate, it will take rather long time and require rather unnecessary land use change and other relevant socioeconomic contribution for China's urbanization level to catch up with the rest of the developed nations. Comparing with these nations would risk being a waste of resources.

From Table 1.3 and Fig. 1.5, we can easily see that as of 2010, there were more than half of the world's population lived in cities. The world was gradually and relatively rapidly entering an urbanized era. Urbanization rate during the past decades was about 0.4 % per year. Urbanization in China, however, experienced an annual growth rate in between 1 and 1.4 % during the same period, which is almost half to 1 % point more than the world's average. The result suggests that although comparing blindly China's urbanization level to that of the developed nations' would be rather futile, the fast urbanization in China would not only determine the future of China's urban development, but also impact significantly the global urbanization trend.

Second, the fundamental conditions for comparing urbanization levels across various regions in China are missing. In China, urbanization is not merely land use change and socioeconomic development. More often than not, the level of urbanization was used as a political achievement for the mayors, county executives or even provincial governors. This is especially true when the central government decided to actively promote urbanization across the nation. Many a time, the local governments were eager to "urbanize" the land under their jurisdiction without much consideration of local conditions and eco-environmental carrying capacities. Urbanization level without much urbanization quality was even praised to be great achievements for local officials. This apparently is a rather unhealthy practice of urbanization. Such a trend started in the "Eleventh Five-Year Plan," and is still pervasive even during the "Twelfth Five-Year Plan."

**Table 1.3** Urbanization level in the world and some countries (regions) from 1980 to 2011

| Country/region | 1980 | 1990 | 2000 | 2002 | 2003 | 2004 | 2005 | 2010 | 2011 |
|---|---|---|---|---|---|---|---|---|---|
| World | 39.5 | 43.4 | 46.8 | 47.6 | 48.0 | 48.4 | 48.8 | 50.9 | 52.0 |
| China | 19.4 | 26.4 | 35.8 | 37.6 | 38.6 | 39.5 | 40.4 | 49.7 | 51.6 |
| China Hong Kong | 91.5 | 99.9 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| China Macao | 98.1 | 98.7 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| India | 23.1 | 25.5 | 27.7 | 28.1 | 28.3 | 28.5 | 28.7 | 30.1 | 31.3 |
| Indonesia | 22.2 | 30.6 | 42.0 | 44.4 | 45.7 | 46.9 | 48.1 | 49.9 | 50.7 |
| Iran | 49.6 | 56.3 | 64.2 | 65.3 | 65.8 | 66.4 | 66.9 | 68.9 | 69.1 |
| Israel | 88.6 | 90.3 | 91.4 | 91.5 | 91.5 | 91.6 | 91.6 | 91.8 | 91.9 |
| Japan | 76.2 | 77.4 | 65.2 | 65.4 | 65.6 | 65.7 | 65.8 | 66.8 | 69.7 |
| Kazakhstan | 54.0 | 57.0 | 56.3 | 56.7 | 56.9 | 57.1 | 57.3 | 58.5 | 59.6 |
| DPRK | 56.9 | 58.4 | 60.2 | 60.8 | 61.0 | 61.3 | 61.6 | 63.4 | 63.5 |
| Korea | 56.9 | 73.8 | 79.6 | 80.1 | 80.3 | 80.6 | 80.8 | 81.9 | 83.2 |
| Malaysia | 42.0 | 49.8 | 61.8 | 64.0 | 65.1 | 66.2 | 67.3 | 72.2 | 72.7 |
| Mongolia | 52.1 | 58.0 | 56.6 | 56.6 | 56.7 | 56.7 | 56.7 | 57.5 | 68.5 |
| Pakistan | 28.1 | 31.9 | 33.1 | 33.8 | 34.2 | 34.5 | 34.9 | 35.9 | 36.2 |
| Philippine | 37.5 | 48.8 | 58.5 | 60.2 | 61.0 | 61.9 | 62.7 | 66.4 | 68.7 |
| Singapore | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Turkey | 43.8 | 61.2 | 64.7 | 65.7 | 66.3 | 66.8 | 67.3 | 69.6 | 71.4 |
| Canada | 75.7 | 76.6 | 79.4 | 79.7 | 79.8 | 80.0 | 80.1 | 80.6 | 80.7 |
| USA | 73.7 | 75.2 | 79.1 | 79.8 | 80.1 | 80.5 | 80.8 | 82.3 | 82.4 |
| Argentina | 82.9 | 86.5 | 89.2 | 89.6 | 89.7 | 89.9 | 90.1 | 92.4 | 92.5 |
| Brazil | 66.2 | 74.7 | 81.2 | 82.4 | 83.0 | 83.6 | 84.2 | 84.3 | 84.6 |
| France | 73.3 | 74.0 | 75.8 | 76.2 | 76.3 | 76.5 | 76.7 | 77.8 | 78.7 |
| Germany | 82.6 | 85.3 | 75.1 | 75.1 | 75.2 | 75.2 | 75.2 | 75.8 | 75.8 |
| Italy | 66.6 | 66.7 | 67.2 | 67.4 | 67.4 | 67.5 | 67.6 | 68.2 | 68.4 |
| Russia | 69.8 | 74.0 | 73.4 | 73.2 | 73.2 | 73.1 | 73.0 | 73.7 | 73.8 |
| UK | 88.8 | 89.1 | 89.4 | 89.5 | 89.6 | 89.6 | 89.7 | 90.1 | 90.5 |
| Australia | 85.8 | 85.1 | 87.2 | 87.6 | 87.8 | 88.0 | 88.2 | 89.1 | 89.2 |

#### 1.2.1.3 A Highly Consuming Urbanization

The rapid urbanization during the past decades doesn't come out free. As a matter of fact, since urbanization level (instead of quality) was one of the standards assessing the local officials' achievements, a rather unique Chinese phenomenon, i.e., rapid urbanization was observed in many regions regardless of regional differences, conditions and other fundamental necessities. Because of that, rapid urbanization in China has incurred ever-increasing conflicts between urbanization and resources/environmental carrying capacities. Some American medium even estimated that under the current rate of urbanization, the demand for energy will double, while demand for water will increase 70–100 % in the next decade in

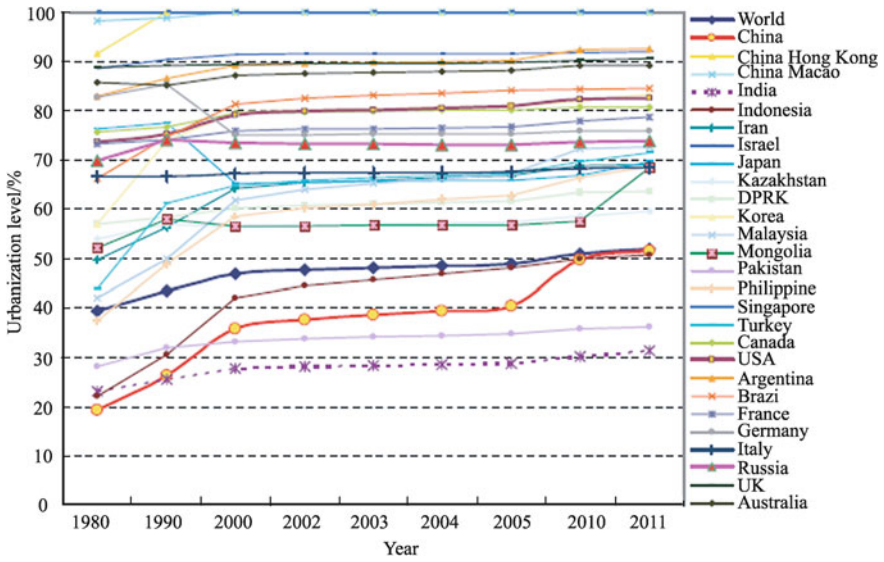


**Fig. 1.6** The annual change in urbanization levels of China and other major cities in the world

China. Moreover, for the past 25 years (1980–2005), every single percentage's increase of urbanization in China consumes 1.7 billion cubic meter of water, requires 1004 $km^2$ of land, and 69.66 million tons of standard coal. For the next 25 years (2006–2030), however, the numbers increase to 3.2 billion cubic meter of water (1.88 times of previously), 3459 $km^2$ of land (3.45 times), and 227.38 million ton of standard coal (3.26 times) [9]. The numbers indicate that maintaining a high rate of urbanization would become increasingly difficult in China. In the meantime, the conflict between urbanization and required land, water and energy will further intensify in the foreseeable future (Fig. 1.7) [10].

This traditional mode of urbanization is apparently a highly consuming process that requires enormous amount of energy, water and land inputs. Some argue that urbanization is really a process that "moves" the entire people from the rural area to the cities because resources are abundant. For instance, the British economists in the Victorian time, William Stanley Jevons described the urbanization in Britain was fast and possible because "North America and Russia are our corn land; Chicago and Odessa are our barn; Canada and the Baltics are our timberland; and Australia is our pasture." Such argument, however, is as outdated as Jevons himself as of now since the world doesn't have the luxury to offer that many resources to support the urbanization of a single island as in the Victorian time, even if we ignore the absolute arrogance of the then colonists' arguments. Yet China produces the largest repetitive construction, and waste enormous amount of resources in demolition and reconstruction. It wouldn't take a genius to figure it out that such a highly consuming urbanization process in China would never last long.

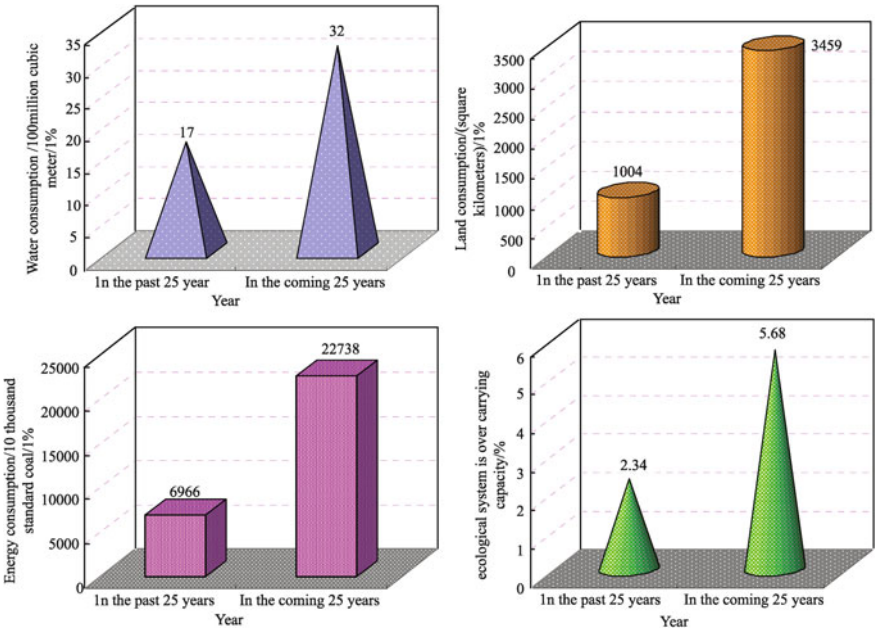


**Fig. 1.7** The change in resource and eco-environmental stress in the urbanization of China

#### 1.2.1.4 A "Polluted" Urbanization

China has experienced not only rapid urbanization, but also rapid industrialization during the past three and half decades (after the economic reform in 1978). As a result, China's socioeconomic development has made remarkable achievements, and China became the second largest economy next only to the United States. In the meantime, however, China's economic development followed a rather bumpy and extensive mode, which renders China the largest (and also the fastest growing) country of waste water discharge. Many studies have suggested that the degradation of environmental services and environmental carrying capacity will become the strictest bottleneck for China's holistic socioeconomic development in the future.

In 1980, the total waste water discharge in China was about 31 billion tons. It reached 59.6 billion tons in 2009. In addition, 1/3 of the monitoring stations indicate the water quality to be grade-five inferior, losing their ecological functions. Cities were where the pollution concentrates. In addition, data indicates that 20 % of the cities have air pollution. Among the 113 major cities, air quality in 67 % of them can't reach the national grade-two level. The fast increase of automobiles is the primary sources for air pollution. Moreover, the rapid urbanization and industrialization also cause the southeastern coastal regions to experience an annual 0.05 °C increase in temperature since 1979. The strong tie between urbanization and industrialization indicates that China's urbanization is a "polluted

urbanization." The price for unhealthy and unsustainable development is enormous, for instance, the cities in Northern China have experienced continuous severe haze. The ensuing health problem of the citizens, and loss of labor hours and economic losses due to that are hard to estimate without adequate data, but a simple guess would suggest its enormousness.

#### 1.2.1.5 Urbanization from Demolition

One of the rather unique characteristics in China's urbanization is that it is a process with constant demolition and reconstruction. As a matter of fact, rapid urbanization encourages rapid urban upgrade, old city renewal, land use expansion, function exchange, and constructions of major projects. Conflicts between property owners (or users in China's context) and the demand for urbanization often lead to extreme actions such as self-immolation. The government has been trying to issue a variety of policies and regulations in order to mitigate the intensifying situation. The primary cause for conflicts is that the price tagged for the land by the developers is often very different from what the property owners' expectation, and it changes very little during the past decades. The old version *Urban Housing Demolition Management Regulations* became actually the regulatory basis for violent demolition. Urban demolition under the name of rapid urbanization became a disguised game of wealth transfer, authority versus rights, and the administrative power of the powerful interest groups versus the property owners' insecurity. From incomplete sources, we found that from October 2009 to May 2011, due to the lack of regulation or flaw of it, there were 22 reported self-immolation incidents that involved 33 individuals and led to more than 20 deaths [11]. The central government has realized the seriousness of such conflicts, and started to implement more rigorous regulation and laws to curb such conflicts and mitigate the damage. *The Ordinance of Housing Levy and Compensation on State-owned Land* (Draft) has been issued and shall be followed to the words. The Ordinance was hoped to facilitate smoothing the relationship between urbanization and land acquisition, and protect citizen's legal private ownership. The proper ways of urbanization and necessary land acquisition and demolition shall follow very strict legal procedures. Negotiation shall always be preferred over conflicts, and the government shall present to the citizens clearly the acquisition and demolition of land are necessary and beneficial to both parties. Proper compensation shall be negotiated and agreed upon by all sides instead of being forced by the more powerful groups. The entire process shall be straightforward, universal, specific, restrictive, and fair to all participants.

#### 1.2.1.6 Crowded Urbanization

China is currently the most populous country in the world with a total population size over 1.3 billion. Although China measures very similar in size to that of the

United States and Canada, its population density is far more than the latter two. Cities are by definition more dense than rural areas. Chinese cities are even more so. Since now there are over half of the population (close to 700 million people, twice the size of the entire United States of America) living in cities, in many of them, especially large, mega and super cities, the space becomes even more crowded. The crowdedness is almost everywhere: traffic, housing, living space, health care, employment, shopping, education, etc., which renders shortage in water, electricity, labor, food, clean air, and in psychological discomfort. The limited resources in cities cause prices of almost everything, from necessities to luxuries to be sky-rocketing, which reduces the residents' feeling of happiness dramatically. This crowdedness is one of the fundamental reasons for the so-called "urban diseases" characterized by traffic congestion, environmental pollution, supply shortage, rampant crime, and overburdened urban infrastructure. Urban scholars argue that such "urban diseases" are inevitable consequences after the relatively uncontrolled Great Jump in Urbanization during the later 1990s. Among all the "urban diseases," high housing price is one of the most devastating aspects in the contemporary Chinese cities, which might eventually "kill" cities' sustainability in the long run.

#### 1.2.1.7 Forced Urbanization

In the process of China's urbanization, real estate is not only one of the most benefiting industries, but also the industry that garners most of the conflicts. Real estate industry in China is almost solely dependent on China's rapid urbanization. The huge inundation of rural population to the cities causes extremely heightened demand for housing/shelter. No speed of urbanization in terms of residential construction could ever match that of the population moving to the cities. Consequently, housing (apartment) prices in Chinese cities, specifically in large, mega and super cities (the ones that attract most migrants), rose to the highest in the world. The benefit of the real estate industry, however, concentrates only to a small group of real estate developers and the original city dwellers, while the majority of city residents (mostly new immigrants) become the so-called "housing-slaves." The huge profit of real estate in large, mega and super cities (and even in many medium-sized cities) encouraged the developers and even local governments to expand the urban proper via demolition and reconstruction under the name of "urbanization." In such sense, urbanization is actually a "forced" urbanization, forced by the seeking of maximizing profit for real estate industries. Some even argue that the real estate industry actually abducted China's urbanization.

In this process, we observed that the local government played a significant role, sometimes even the leading role in promoting the development of real estate industry, but under the name of urbanization. This is because under the current financial system, the local financial income often can't balance off well with the expenditure. Since in China, land is owned by the state, it is almost a no-brainer for the local governments to implementing the so-called "land finance." The local governments rent out the land to various developers for real estate development,

which in some cases even become the primary source for local financial incomes. From a rough estimate based on officially released data, in 2012, the governments and banks gained over 4791.7 billion Yuan (RMB) from renting the land, which is almost three quarters of the 6400 billion Yuan from real estate sales of that year. Among them, 40 % of the housing price was used to pay off the government's land rental fee. Some local governments even "created" the so-called "one house four earnings" strategy to maximize their profits. The first earning is from land rental fee. The second earning is from the 20 % property transfer tax (if the property was sold in the market). The third earning is from property tax. The fourth earning is from inheritance tax. Apparently, in this mode, the local governments have benefited enormously from the development of real estate abducted urbanization, the majority of the citizens, on the other hand, doesn't.

### *1.2.2 The Sub-healthiness of China's Urbanization Does not Indicate Pseudo-urbanization*

The above discussion suggests that China's urbanization is not entirely a "healthy" urbanization (or full urbanization that follows the expected social, economic, and spatial paths). One of the important manifestations of such sub-healthiness is that the quality of urbanization is not on a par with the level of urbanization. From the experiences of developed countries, the level of urbanization was often used to measure the progress of urbanization and socioeconomic development in a specific country/region. One of the important features for such measurement to be possible is that the levels of urbanization always agree almost perfectly with the levels of industrialization in the capitalized world (Europe and North America). This is understandable considering the long history of urbanization and industrialization in the West for over 200 years. This is not the case in China, however. Although it took 47 years for China to finish the initial stage of urbanization, it was not due to the coordinated development of urbanization and industrialization, but rather a combined result of a variety of socioeconomic and political factors (most notably the unique household registration system). The economic reform in 1978 released the enormous economic and societal developing forces in China. Although the household registration system wasn't relaxed, restrictions on migration from the rural areas to the cities were largely lifted. Urbanization progressed at an unprecedented rate, while industrialization lagged behind. As of now, the level of urbanization is 2.49 % above industrialization. More alarmingly, the rate of urbanization is 3.1 % higher than the rate of industrialization. The direct impacts include (but not limit to) insufficient employment opportunities, low level public services, low urban management efficiency, difficulty of converting rural dwellers to city dwellers, increasingly prominent shortage of water, electricity, land, housing, and labor, and declining resources and eco-environmental security. These all kept the quality of urbanization low. Urbanization becomes an empty shell without the support of proper industrialization.

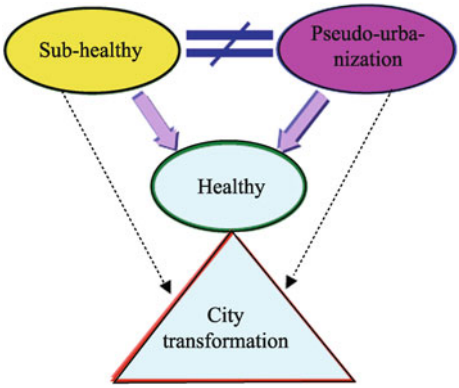


**Fig. 1.8** Urbanization sub-healthiness and pseudo-urbanization

On the other hand, we must also admit that China's urbanization, though is sub-healthy, progresses in the right direction. Urbanization rate in China is above the global average. The rapid urbanization would occasionally lead to incomplete urbanization, inaccurate urbanization level hence low quality urbanization. Moreover, the strict household registration system, which was designed to prevent rapid urbanization in the early 1960s, has now generated a so-called "semi-urbanization" phenomenon. Semi-urbanization refers to the scenario that although there are large amount of industrial workers who live and work in the cities but are not registered as urban residents (*Chengshi Hukou*), they often receive limited public services than their urban peers. This is the primary manifestation of the sub-healthiness of China's urbanization. The phenomenon though has its historical reasons, can be dealt with and eliminated eventually. In recent studies and media reports, however, such phenomenon was used as a proof to support a so-called "pseudo-urbanization" in China (Fig. 1.8). We disagree with such a proposal and argue that sub-healthy urbanization is not pseudo-urbanization [12].

#### 1.2.2.1 Why the Concept of Pseudo-urbanization

The argument that China is not really urbanizing but pseudo-urbanizing has its deep root in four specific aspects, i.e., the institution, construction, statistics and political achievement. We will outline these four aspects in details below.

First, Institution level: the legacy of the household registration system. As aforementioned, the household registration system was designed to prevent free movement of a nation's population in order to control rapid urbanization. It was supposed to be a make-shift for cities to take a break and prepare their industrial development and infrastructure bases to accommodate ensuing urbanization. However, the household registration system remained in effect even after the socioeconomic system in China has changed drastically from planned economy to

market economy. The direct consequence of the household registration system is to generate an urban-rural dual structure with increasing inequality between the urban and rural areas. Citizens are divided artificially into urban and rural dwellers. The urban dwellers enjoy many more public services and societal management opportunities than their rural counterparts. Quality of life for rural residents is often far lower than that of the urban residents (around 31.9 % to be exact). An often-observed and exposed fact is that there are more than 158 million migrant workers in cities who lived there for at least 6 months, and 140 million residents living in the township but working in the farmland. These 298 million citizens (almost the size of the United States of America) enjoy much less (if at all) social benefits and public services than the urban registered citizens living in the same cities or towns because they are registered as rural household. Most of them are already an integrated part of the cities and towns they now live in, yet the institutional barrier (household registration system) artificially makes them inferior. Such facts are the basis for the term "pseudo-urbanization" in that urbanization counting this part of the urban residents is not necessarily urbanization per se.

Second, Construction level: the phantom urban population increase due to "migrant" workers oscillating between rural and urban regions. Urbanization in China, as aforementioned, is often accompanied by extensive land use changes due to governmental land requisition system. One of the primary problems in implementing land requisition is that the infrastructure construction rate and level falls far behind the rate of land requisition. One of the conditions of land requisition is to convert farmers who used to work (not own, though) on the land to be city registered residents. The reality is that although these former rural registered citizens are now city residents (registered), the urban infrastructure (housing, road, public services, etc.) can't meet the increasing demands of this group of newly added urban population. In China, there are more than 50 million so-called "three-no" population, namely, no land, no employment, and no security due to the rapid urbanization and rural to urban registration conversion. In addition, China has adjusted its administrative divisions numerous times which converted many of the rural villages to be small townships (as well as the household registration from rural to urban). Due to the strict household registration system, such conversion almost immediately increased China's "urban" population because the "villages" they were living now became "towns" due to administrative changes. Such changes are mostly nominal without significant improvement in urban infrastructure including education, health care, housing, employment, transportation and social relief services, which leads to the argument of "pseudo-urbanization."

Third, Statistical level: non-uniform statistics of urban population leads to various results of China's urbanization level. After the establishment of the People's Republic of China in 1949, China has conducted six censuses in 1953, 1964, 1982, 1990, 2000 and 2010. The problem is the standard for urban-rural division in each of the six censuses is different, which causes the calculation of China's urbanization rather unreliable. Most scholars argue that the numbers calculated from the censuses tend to be higher than the actual urbanization level. For instance, the most recent (sixth) census in 2010 indicated that China's urbanization level reached

49.68 %. The number from the National Bureau of Statistics, however, suggested it was only 47.6 %, yet it jumped to 51.3 % in 2011. Such a "game of numbers" is a direct legacy from the planned economy in which higher statistics often means higher allocation of national resources since that's the only way to get resources. The lack of a standard way to obtain China's urbanization level hence leads to the argument of China's pseudo-urbanization.

Fourth, Political achievement level: another legacy from the planned economy that faster, higher level of urbanization is one of the local officials' political achievements. Local governments actually use the level of urbanization as an assessment means to evaluate officials' political performance. Such a "higher and faster are better" mindset almost immediately leads to policies that encourage the increase of urbanization level (increase of urban population) without much consideration of environmental carrying capacity, urban infrastructure carrying capacity, and other urbanization quality aspects. We term such a mindset as the so-called "political achievement sickness" of urbanization. Such mindset also leads to the argument that China's urbanization during the past decades are but pseudo-urbanization.

#### 1.2.2.2 Rational Discussion of the "Pseudo-urbanization" Phenomena

From the above discussion, we do see that the term pseudo-urbanization has its root in China's current urbanization process. We contend that China's urbanization, though with various problems and fluctuation, is not "pseudo." We do agree, however, it will not be an easy task to eliminate the falsehood and retain the truth of China's urbanization and distinguish it from pseudo-urbanization. There will still be issues from the institutional and political levels, especially the phantom influence of planned economy will linger for quite a while. We intend to provide a few rational thoughts in the debate and discussion of China's urbanization, and hopefully the discussion will contribute to a sustainable future of China's urbanization.

First, China's urbanization does gain significant momentum during the past decades, especially after the economic reform in 1978. It will be both irresponsible and inaccurate to describe the progress of China's urbanization as "pseudo." The harm the term "pseudo" does to China's urbanization process is not just descriptive, but could lead to a total reject of the actual achievements and improvements cities in China gained during the past decades. Moreover, the wide use of such term, especially by the semi-professional news media, could lead to significant underestimate of China's economic drive and urbanization progress, which could sway potential investors and businesses from entering China's cities, hindering their sustainable development. It is hence urgent to warn scholars and news media the harm such term could do to China's urbanization.

Second, we propose to experimenting reform of China's household registration systems, and establishing uniform automated registration system nationwide. Our discussion of China's urbanization and reasons why "pseudo-urbanization" gain its popularity very much lead to one particular legacy item in China's unique

urbanization process, i.e., the household registration system. Voices of reforming the household registration system have been uttered for quite some time. A quick removal of the household registration system would incur more chaos; yet it also becomes crystal clear that the existence of the system will almost always lead to harmful terms such as "pseudo-urbanization." In addition, the household registration system is also the fundamental reason for unequal rural-urban division, and the fairly unique Chinese urban-rural dual structure. Reforming household registration system is way past due. We do suggest, however, to reform the system gradually and slowly to avoid abrupt changes and unnecessary chaos like many of the socioeconomic "shock remedies" tend to do. The first step, we propose, is to replace the terms "city residents" and "farmers/peasants" with a single term "residents." Any Chinese citizen, as long as he satisfy certain basic conditions, can register as a resident in any places, be it cities or villages. Once the individual registered as a "resident" in a specific location, s/he shall be eligible for the same rights and benefits as residents in that location. Apparently, the pre-condition for successful implementation of such plan is to improve the public benefit and service levels across the entire nation, regardless of cities or villages. A nationwide implementation of such reform doesn't, at least for now, have such necessary pre-condition. Hence, for the second step, we propose to choose a few experiment spots, especially the ones with relatively highly developed socioeconomic status and relatively diminished urban-rural division, such as Guangdong Province, Chongqing Municipality, for pilot implementation. The goals are to eliminate the inequality introduced by the household registration system, remove the urban-rural dual structure, and promoting social fairness. The results from the experimentation could then be examined, studied, and if successful, gradually spread to other parts of China. In practice, the implementation could follow a gradual process. The original household registration can be preserved. The total amount of "resident" registration can be increased gradually with increasingly relaxed conditions. The ultimate goal of the reform would be to gradually meet the demands of migrant works in urban employment, fair payment, children schooling, public health, housing and social security, and ensure they are treated the same as local residents. Successful implementation of such reform would eventually convert the urbanization in China from urbanizing the elements to urbanizing the people.

Third, it is crucial to develop a standard way of assessing urbanization instead of being led by various political goals. The first and most important step of establishing a standard assessment for urbanization is to build a relatively complete database of various indicators to assess the society, science and technology, resources and environment. A uniform urban and rural resident survey shall be created for census purposes. Calculating urbanization shall avoid relying on the household registration system; instead urbanization level shall reflect the actual amount of people who (permanently) live in the cities, regardless of their household registration. Development and construction of urban infrastructure and other public service establishments shall then be based upon this actual urbanization level instead of what was reflected by the household registration system. In so doing, urbanization will gradually agrees with industrialization, employment

opportunities, and public services level. The same principles shall apply to other fields of city management and governance, including financial, education, taxation resources, and quota for People's Representatives, (Communist) Party Representatives and Chinese Congress Members.

Fourth, the new mode of urbanization shall start to look beyond the sheer number of urbanization level to incorporate urbanization quality within. As of now in China, the most important step to take for a successful and complete implementation of New Urbanization is to re-educate governmental officials, and change their mindsets that urbanization is more than just how many people living under their jurisdiction, but how well such living is. Actions of blindly seeking higher number of urbanization level need to be curbed. The growth rate of urbanization shall be based on sustainable urbanization principles. For current stage of China, a 0.6–0.8 % increase annually would be suitable. Evaluation of governmental officials and their performance shall downplay the number's games, but focus more on "quality" genre of indicators, which includes the quality of living, resources and environment conditions, sustainable urban infrastructure construction, intensive and efficient land use mode, increase of employment, urban environmental quality, urban social security system and other relevant public services for residents in the cities. This is critical for demystifying the "pseudo-urbanization" phenomena, and changing China's urbanization from sub-healthy to the fully healthy, sustainable New Urbanization.

## 1.3 Resource and Environment Constraints for China's New Urbanization

The New Urbanization in China is an ultimately sophisticated socioeconomic process. Moreover, urbanization is also an interaction between human beings and the resource bases and environments. New Urbanization seeks sustainable and harmonious relationships between the human and the land. Two principles, namely, "people-oriented" and "land-fundamental," shall always be followed when implementing New Urbanization developmental strategies. How to follow these two principles, maintain a harmonious and sustainable interaction between human and land, and deal with the fundamental resources and environmental restrictions, will be the most imminent issues New Urbanization in China faces in the immediate future.

### *1.3.1 The Four Increasingly Severe Resource and Environment Constraints*

From in-depth analysis via simulative models of the relationships between China's urbanization and resources and environment security from 1980 to 2030, we conclude that China's New Urbanization will face increasingly stringent resources and

environmental restriction. It is forecasted that Chinese cities' energy demand will be doubled, and water demand will increase 70–100 % in the near future. The Chinese Academy of Sciences also predicted that China's future urbanization will need 1.89 times the energy currently consuming, and 88 % more water. The pressure to the ecosystem and environment will be 1.42 times the current level (Tables 1.4 and 1.5). Apparently, if we cannot have secured resources and environmental services in

**Table 1.4** Urbanization and required resources in China from 1980 to 2030

| Year | Urbanization level/% | Water/100 million cubic meter | Land/km$^2$ | Energy/10,000 standard coal |
|---|---|---|---|---|
| 1980 | 19.39 | 88.34 | 6720 | 60,000 |
| 2005 | 42.99 | 502.06 | 29,636.83 | 224,682 |
| 2020 | 60.00 | 870 | 72,552 | 404,640 |
| 2030 | 65.00 | 1150 | 118,180 | 600,000 |

*Note* Energy consumption is calculated based on the 4 % maximum growth rate regulated by the *energy efficiency and long-term special plan* (2004)

**Table 1.5** The amount of resources required for every 1 % increase in urbanization from 1980 to 2030

| Items | From 1980 to 2005, the amount of resources required for every 1 % increase in urbanization | From 2006 to 2030, the amount of resources required for every 1 % increase in urbanization | How many times the future is comparing to the past | Resource consumption trends and the resources and environment security levels |
|---|---|---|---|---|
| Water/100 million cubic meter | 17 | 32 | 1.88 | Water consumption increases rapidly as urbanization level increases. Water security level decreases rapidly |
| Land/km$^2$ | 1004 | 3459 | 3.45 | Land consumption increases rapidly, and land security level decreases rapidly |
| Energy/10,000 standard coal | 6966 | 22,738 | 3.26 | Energy consumption increases rapidly, it becomes increasingly hard to obtain sufficient energy |

the near future, the New Urbanization will have very little chance of success [13]. We will detail the four most significant restraints that might hinder the successful implementation of China's New Urbanization if not adequately addressed.

#### 1.3.1.1 Water Restriction in the Rapid Urbanization Era

Water resource is one of the fundamental life-support resources. Sustainable urbanization can never progress without water and sustainable management of water resources. During the recent years, when China's urbanization picks up the speed, average urban water demands increase at a rapid rate as well. Urbanization and industrialization levels in China will undoubtedly further improve in the future, which renders water security to be a critical factor for future urbanization/industrialization. Our calculation indicates that from 1980 to 2005, every 1 % increase in urbanization level requires an additional 1.7 billion cubic meters of water. Among them, 940 million cubic meters are for domestic consumption, and 760 million cubic meters are for industrial consumption. We detail the relationship between water usage, various types of water usage and their relationships with urbanization below.

First, in 1980, urbanization level in China was around 19 %, the total water usage was 8.834 billion cubic meters. When urbanization level reached 43 % in 2005, the total water usage increased to 50.206 billion cubic meters, which corresponds to a 172.4 million cubic meters increase per 1 % increase of urbanization level. The relationship between urbanization level and water usage, of course, is not linear. When urbanization level is less than 30 % (the initial stage), total water usage increases rather dramatically per 1 % increase of urbanization. Once urbanization enters rapid development (after 30 %), the increasing rate for total water usage per 1 % increase of urbanization actually decreases. Simulative model suggests that during and after the rapid urbanization, on average, total water usage actually decreases per every 5 % increase of urbanization.

Second, unlike the total water usage, domestic water usage increased dramatically regardless of which stage urbanization is in. In 1980, the urban domestic water usages was 3.391 billion cubic meters, which increased to 24.374 billion in 2005, an average increase of 889 million cubic meters per 1 % increase of urbanization, over five times that for the total water usage. This is understandable. As urbanization level increases, not only population size increases, but also quality of life, and other relevant services have to increase as well, which directly linked to ever more domestic water usage.

Third, industrial water usage, however, follows closely the trend as the total water usage. From 1980 to 2005, industrial water usage increased 760 million cubic meters per 1 % increase of urbanization. The increase rate of industrial water usage decreases after urbanization entered a rapid developing stage. Again, this is understandable since urbanization often accompanied by development in science and technology, which would eventually improve industrial water usage efficiency, hence the reduced amount of water usages per 1 % of increase of urbanization.

Fourth, our simulative model suggests that from 2006 to 2030, every 1 % increase of urbanization demands 3.2 billion cubic meters of water. Among them, domestic water will need 2.3 billion cubic meters more, while industries need 960 million cubic meters more. Comparing to the previous 25 years, water requirement per 1 % increase of urbanization increased rather rapidly. More importantly, getting enough water to support urbanization will become increasingly difficult. It is estimated that there will be 15 billion cubic meters of water shortage by 2020. Urban water security decreases as urbanization level increases. Spatially, the eastern coastal cities will be on the top of water shortage list. This is because water usage is also related with economic growth, while more developed cities often requires higher amount of water, especially domestic water.

#### 1.3.1.2 Urban Land Shortage

If water is the guarantee for life, land is then the fundamental carrier for urbanization. Urbanization is meaningless without adequate land supply. The limitedness of land indicates that urbanization can't expand in space endlessly. For China, as the country is entering the rapid urbanization era, the conflict between land demand and land shortage is salient. This is especially true in the relatively developed east and south coastal cities. China has set the lower limit for the cultivated land to be 1.8 billion mu (120 million ha). By law, this number can't be breached for no matter what reasons. The previous mode of urbanization by claiming adjacent cultivated land becomes increasingly difficult.

From 1980 to 2005, every 1 % increase of urbanization required 1004 $km^2$ land for urban expansion. A simulative model suggested that from 2006 to 2030, every 1 % increase of urbanization will need more than three times that number, 3460 $km^2$. This clearly indicates the current mode of urban land acquisition is not sustainable and might very well not even be possible due to the "red line policy" regarding cultivated land (the 1.8 billion mu cannot be sacrificed). Our simulative model suggested that by 2020, the total urban land use will reach 72,550 $km^2$, but the available land for urbanization will only be 64,813 $km^2$, a gap of 7740 $km^2$. The majority of the land shortage concentrates on the coastal developed regions, as urbanization tends to be the fastest, and land demand the most prominent. Apparently, land availability in the short term will become the strongest bottleneck for rapid urbanization. It is hence imperative to find ways to coordinate fast urbanization and stringent land supply. Recent discussions on "smart growth," "vertical urbanization" might provide promising solutions.

#### 1.3.1.3 Ever-Increasing Energy Shortage

From 1980 to 2005, every 1 % increase of urbanization requires on average energy level equivalent to 69.66 million tons of standard coal. While from 2006 to 2030, our simulative model suggests that every 1 % increase of urbanization requires 3.26

times that number, namely, 227.38 million tons of standard coal. China has recently signed on the global emission reduction task force, and is committed to reduce its emission of greenhouse gases, and actively promotes the low-carbon economic development and life style. Increasing energy demand by urbanization is almost in direct contradiction against such commitment and is certainly not sustainable. Again, the energy shortage (both actual and political) is the most prominent in the coastal regions where economy is highly developed. Ways for low-carbon, and low energy consumption urbanization will become one of the pressing tasks for the New Urbanization in the near future.

#### 1.3.1.4 Increasingly Degrading Eco-environmental Quality

From the statistics, during 1950–2010, based on ecological footprint calculation, every 1 % increase in urbanization increase the per capita ecological footprint by 0.08 $hm^2$, the intensity of ecological footprint drops 1.15 $hm^2$/Yuan, and the ecological system is over carrying capacity by 2.34 %, the synthetic index of eco-environmental quality drops 0.0073. Our simulative model further suggests that for the next 40 years, for every 1 % increase of urbanization, the per capital ecological footprint will increase 0.11 $hm^2$, its intensity will drop 0.06 $hm^2$/Yuan, over carrying capacity by 5.68 %, and the synthetic index will drop 0.0064. If urbanization proceeds as it is now, by 2050, the ecological system will be severely overburdened, and eco- environmental quality will keep worsening [14].

### *1.3.2 Suggestions to Relax Resource and Environment Constraints for China's New Urbanization*

The above discussion clearly indicates the current mode of urbanization is not sustainable. If China continues its urbanization without changing its high demands for water, land, energy and eco-environmental carrying capacity, urbanization will eventually stop and regress, or even collapse due to severe limitation of water, land, energy and drastically deteriorating ecological services and environmental quality. Cities will no longer be centers of wealth and prosperity, but "natural" exhibitions of deterioration and depression. It is under such circumstances that we propose the people-oriented New Urbanization for which a scientific concept of development is the core. New Urbanization will be sustainable urbanization in that human development will be within the carrying capacity of resources and environment basis. New Urbanization focuses more on urbanization quality instead of quantity. Under the principle of New Urbanization, the rate of urbanization will be maintained and managed to accommodate the rate of internal infrastructure and public services development. In summary, the New Urbanization will be resource conservative, environment friendly, economy efficient, and society harmony. We propose a few

suggestions below in a hope to alter the current mode of urbanization and transition to New Urbanization.

#### 1.3.2.1 Urbanization Shall Proceed Within the Resource and Environment Carrying Capacity

One of the lingering legacies of the planned economy in today's China is that quantity almost always needs to be stressed over quality. New Urbanization, however, needs to focus more on urbanization quality than sheer numbers of urbanization (level, speed, etc.). New Urbanization must realize the severe constraints posted by limited water, energy, and land resources, and eco-environmental carrying capacity. The rate of urbanization shall be managed within the resource and environment carrying capacity, and agree with the economic quality, social quality and environmental quality. For the entire nation, our simulation and calculation suggest an annual urbanization rate of 0.6–0.8 % would be appropriate, though regional variation is possible. Local governments shall alter their mindsets of quantity over quality, and shall avoid blind comparison of speed or other quantitative indices without proper consideration of the reality. Instead, governments shall stress more on urbanization quality, stick to the principles of compactness and efficiency, focus on urban infrastructure construction and efficient utilization of existing urban land, facilitate urban job market, improve urban environmental quality, enhance social security system, and provide the most fundamental public services to their citizens (residents). In so doing, the nation is able to urbanize sustainably, and with high quality.

#### 1.3.2.2 Urbanization Shall Incorporate Resource and Environment Security

Unlike the developed nations in Europe and North America, or the developing nations in the Latin America, China since the late 1980s faced the dilemma of "huge population, very limited resources." Such unique characteristics dictate that China's urbanization (the New Urbanization) will not and cannot follow the same route as being followed by those countries. Apparently, resource and environmental carrying capacity shall be the one critical quantity that all the city governments need to evaluate annually. Not only individual cities shall have their resource and environment carrying capacity evaluated, the entire nation shall have an overall estimation as well. This quantity will then be used as the fundamental "red line" for sustainable urbanization. No cities shall develop beyond this "red-line," nor will any city bypass their red-lines and encroach on other region's carrying capacity. The principal concept of New Urbanization is to urbanize with low resource consumption and low environmental degradation. In this regard, urbanization in Germany regarding energy and land conservation could be good examples that we can follow. In addition, New Urbanization will heavily rely on the development of

science and technology to promote water, land, and material conservation. Future cities will be water, land, material, energy conservative and low-carbon. The resources and environmental security for urbanization will eventually integrate to the national security of resources and environment.

#### 1.3.2.3 Incorporate the Resource and Environment Constraint and Carrying Capacity Indicators for Urbanization to China's Long Term Development Plans

China has been regularly designing its "Five-Year" plans at the national level. Many provinces, counties and even municipalities also have their own "Five-Year" plans. These "Five-Year" plans, though a clear legacy from the planned economy, do provide useful and effective guidance to local socioeconomic development since it sets various goals and proposes specific actions to achieve those goals. Urbanization has long been incorporated in such plans, but only the urbanization level and its growth are mentioned. For successful implementation of New Urbanization, it is necessary to borrow the popularity and effectiveness of these "Five-Year" plans to set goals to recognize urbanization's resource and environment constraints. Moreover, the water, energy, land consumption, and waste discharge per 1 % increase of urbanization shall be incorporated in these plans. They shall belong to the same category as water, energy consumption and waste discharge per unit GDP; hence goals to reduce them can be set. In addition, these indicators shall also be used to evaluate local officials' performance, so that the officials will gradually develop a mindset that will focus more on urbanization quality instead of just the quantities (level of urbanization, speed of urbanization, etc.).

#### 1.3.2.4 Establish the Dynamic Transfer Mechanisms of Urbanization Development Tailored to Local Conditions to Protect Resources and the Environment

With the dynamic transfer mechanism, we shall be able to monitor resources consumption and environmental degradation information over time, and adjust the speed and mode of urbanization to avoid over-consumption and over the environmental carrying capacity. In general, for regions with relatively abundant resource supply and generous environmental carrying capacity, urbanization can speed up accordingly; while for regions with limited resources and environment capacity, urbanization shall slow down to ensure the development is within the limits. For regions with low resource and environment capacity, yet still urbanize fast by encroaching into other region's resource and environment basis, we shall stop the urbanization process, and transfer (dynamically) the population that is over the capacity to other regions with relatively higher capacity. This dynamic transfer mechanism shall be able to ensure that urbanization across the entire nation is within capacity hence sustainable. In the meantime, it is also important to actively

establishing storage system for strategic resources and protection system for the eco-environment to further improve the resource and environment security for urbanization.

Looking to the future, China is bound to be a highly urbanized country. To ensure such high level of urbanization to be prosperous and sustainable, urbanization shall always proceed within the national resource and environmental carrying capacity and support capacity.

## 1.4 The Paradox of New Urban District Construction Versus New Urbanization

China is now in the rapid urbanization stage. Under the principles of New Urbanization, China's urbanization will be efficient, low-carbon, ecological and environment friendly, creative, intelligent and peaceful. On the other hand, land shortage is almost inevitable. Under such circumstances, some regions attempt to obtain more lands via development of new city districts [15]. As a matter of fact, the success of Shanghai's Pudong New District development encouraged other regions to follow suit, which led to a boom of new urban district development across the nation [16]. On one hand, new urban district development indeed addressed largely the urgent land shortage issue. On the other hand, however, the somewhat blind mimicry also exposed many practical issues that need to be taken care of. As of the time of this writing, we believe there is more than enough new urban districts development than needed and sustainable. Yet many regions are waiting eagerly for the new National Urbanization Development Plan to be issued so that they can propose for more new urban district development via the excuse of promoting New Urbanization. Most of such new urban district development proposals lack top-level planning and design. Some new urban districts were never fully developed after being approved. Still, local governments are proposing for more new urban district development plans nonetheless, attempting to obtain more land in so doing. Apparently, the mindset of "more is better" without tailoring to local conditions is behind this zest of new urban district development, which needs to be curbed in case the New Urbanization falls back to the old urbanization tracks. In this concluding section, we'll outline the new urban district development in China, its current status, development mechanism and ways to guide this development to be within the sustainable New Urbanization principles.

### *1.4.1 The Great Achievements of New Urban District Construction in China*

Starting from the construction of Pudong New District, Shanghai, new urban district construction has served as an extremely important component of the New

Urbanization, and has contributed significantly to China's industrialization and urbanization. Specifically, this can be explained in four aspects.

#### 1.4.1.1 Construction of the New Districts Provides Accommodation for the Increasing Population and Improved Urban Living Conditions Considerably

One critical contribution of the new district construction is that it solves the immediate problem of the contradiction that there are more than enough job opportunities but less than enough living spaces in cities. This is especially true in Shanghai prior to the Pudong New District opening to business. As of now, Shanghai's Pudong New District gathered 5.452 million people, accounting for 22.9 % of Shanghai's total population, and is now the largest district in Shanghai. Chongqing, another provincial level municipal, experienced similar success in new district construction. As of 2013, the Two Rivers New District has gathered 2.97 million people, and it is planned that over half of Chongqing's 30 million population will be living in this new district. In Tianjin, yet another provincial level municipal, its Binhai New District gathered 2.55 million people, accounting for 18.2 % of the municipal's total population. Examples as such are abundant in China during the past decade. These newly established districts attract both population and job opportunities, contributing significantly to local economic development. Comparing to the old districts, these new ones often have higher standard and better infrastructure, which improved the living conditions dramatically.

#### 1.4.1.2 New Districts also Promotes Urban Industrial Transformation and Upgrading, Improves the Efficiency and Quality of Urban Development

The above mentioned Pudong, Binhai, and Two Rivers new districts are the new growth poles for Shanghai, Tianjin and Chongqing. Their success enables them to become national level strategic locales for new, high-tech, and advanced manufacturing industries, and modern service industry clusters, innovation demonstration areas and experimental free trade zones. They are indeed the new portals, new bases, new experimenting areas and new engines to cities' development, and contribute significantly to national economic development and the cities' economic transformation and upgrading. For instance, in 2013, GDP in the Pudong New District accounted for 30 % of Shanghai's total, with 2.6 % more developing rate than the municipal total. Import and export accounted for 56.6 % of the municipal total, with 2.9 % more increasing rate than the municipal. Similarly, GDP in Tianjin's Binhai New District accounted for 55.8 % of the municipal total, the growth rate was 5.0 % more than the municipal average. Import and export accounted for 69.6 % of the municipal total. Although Chongqing's Two-River New District's GDP accounted for 13.03 % of the municipal total, its growth rate

was 3.7 % more over the municipal growth rate. Apparently, many such new districts act as the vanguard for urban socioeconomic development, and will continue to do so in the foreseeable future.

#### 1.4.1.3 Urban New Districts Effectively Shared Many of the Old Cities Functions, Mitigating the Increasingly Severe "Urban Diseases"

During the economic globalization and ensuing rapid urbanization, cities in China, especially large and mega cities have attracted huge amount of migrants. Fast population growth quickly saturated the capacity of cities' infrastructure, such as housing, transportation, environment capacity, energy supply, health care, and public safety measures. The imbalance between fast growing population and limited and slow growing urban infrastructure capacity created the so-called "urban diseases," mostly manifested as traffic congestion, housing shortage, environmental pollution, and increasing difficulties to get necessary public services. Construction of new urban district provides an immediate solution to all these issues via providing much needed urban infrastructure and functions. More importantly, via active interaction with the old city districts, the new districts are even able to facilitate industrial upgrading in the main cities, providing a quick remedy to urban diseases and promoting possible sustainable urban development.

#### 1.4.1.4 New Districts Expand the Urban Development Space and Optimize the Urban Spatial Structure

New urban districts, if planned appropriately and built scientifically, will provide spaces to accommodate increasing urban population, create job opportunities, ease overburdened urban functions, and improve urbanization quality. Moreover, the added spaces of the newly constructed urban districts enable more beautiful urban ecological spaces, more compact and efficient production spaces, and more comfortable living spaces. Apparently, successful implementation of new urban districts is able to expand the development potential of the old cities, and provide physical spaces for sustainable urban future.

### *1.4.2 New Urban District Construction Characterized as "Too Much" and "Too Big"*

One critical point that needs to be stressed here is that successful implementation of new urban district construction requires one essential resource, namely, available lands. At least with the current science and technological development, all new districts must consume certain amount of land, which might not be available

everywhere or every-when. One prominent issue in China's urbanization is that one good example could generate a style or trend for many to follow, regardless of local conditions and restrictions. This is unfortunately the case for new urban district constructions, while Pudong, Binhai, Two-Rivers seemingly tell successful new urban district stories, everyone else is eager to follow suit, which eventually leads to more problems than solutions.

#### 1.4.2.1 New Urban District Often Suffers from Being "Too Big" and "Too Many"

Oftentimes, construction of the new urban districts lacks scientific planning and rational guidance. As a new approach to mitigate increasingly severe urban diseases, urban new districts construction became a primary source to support urbanization and economic development after the economic reform and open door policies were issued in 1978 [17, 18]. By the end of January, 2014, there were 106 various new urban districts under construction (Fig. 1.9). Among them 13 were approved at the national level, 38 were approved at the provincial level, and 64 were approved at the municipal level. 19 such new districts occupy total land area over 1000 $km^2$ each, 10 are within 500–1000 $km^2$ and 40 are within 100–500 $km^2$.

At the national level, there were only 3 new urban districts approved prior to 2010, namely, Shanghai's Pudong New District (1992), Tianjin's Binhai New District (2006), and Chongqing's Two-Rivers New Districts (2010). The Zhoushan Islands New District in 2011, and Lanzhou New District and Nansha New District in 2012, and Xi'an-Xianyang New District and Guiyang-Anshun New District in 2014 were added afterwards in a hope to replicate the successful experiences in the three previous new districts. At the provincial level, Henan province is among the most active. From February 2010 to January 2013, in less than 3 years, there were 14 new provincial districts approved. With the existing Zhengzhou and Luoyang new districts, there were 16 approved new urban districts in Henan Province alone (over 40 % of the national total).

Except for Beijing, all the provincial municipals have their new urban districts. In addition, the Separately Listed Cities and Capital Cities have their own new districts. Most prefecture-level cities and even some county-level cities either had new urban districts or are in the process of considering the construction of new urban districts. Not only are many cities seeking to expand their development spaces via the proposal and construction of new urban districts, but also do the ones that have already got approved seek further expansion of their new districts. From our field survey, we found that the Lanzhou New District, with 806 $km^2$ approved land area, started to ask for more in less than a year. This is not unique in Lanzhou, however, many cities deem new urban district construction as a golden opportunity to expand their urban spaces, hence accelerate their urbanization rate (again, a typical "more the better," "quantity over quality" mindset from the planned economy legacy). Some cities even have more than one new urban district. The planning and implementation of these new urban districts often lack scientific feasibility

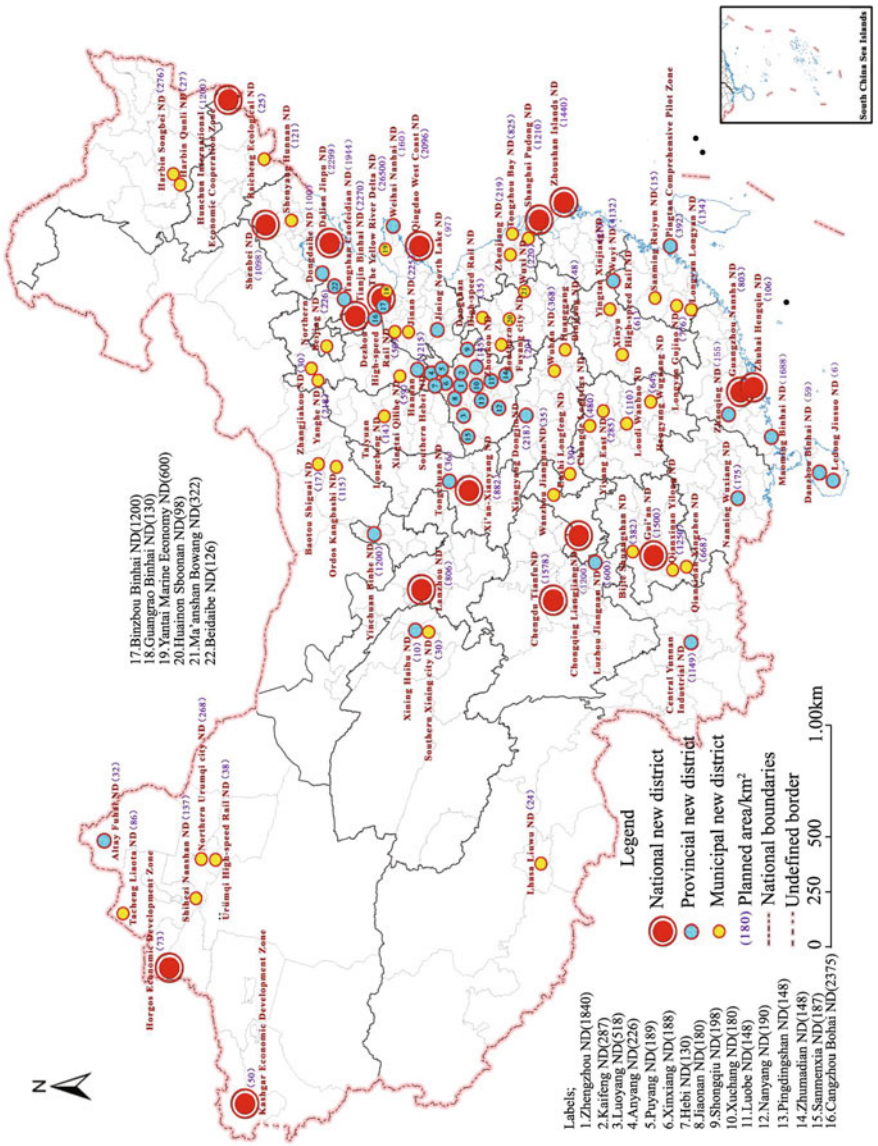


**Fig. 1.9** Latest distribution of new district (ND) construction in China

studies and appropriate evaluation and guidance. The immediate consequences are that there are more new urban districts than needed. The new districts are often under-constructed, lacks in necessary urban infrastructure and public services. In some extreme cases, the new urban districts became not a solution to the existing urban diseases, but part of the diseases themselves in that they led to real estate bubbles and forced the local governments to be heavily dependent on land finance. Moreover, construction of new urban districts also over-consumed very limited land resources. Some of the new urban districts were actually not necessary as there really weren't many urban diseases or needs for expansion, which renders these new districts to be approved and abandoned. In addition, since there wasn't strong demands for a new urban district, many such new districts were often left empty of people, economic activities and urban infrastructure constructions.

#### 1.4.2.2 Many New Urban Districts Tend to Ask for More Land

It seems to the local municipal governments that new urban districts construction is one great way to acquire as much as possible land resources for rapid urbanization regardless of whether such expansion is needed or even possible considering the resources and environmental capacity. Up until now, there is over 73,000 $km^2$ land that has been approved for new urban district construction, which is almost twice the land area than the existing urban proper area in China (38,000 $km^2$). By the end of 2012, there were 30 new urban districts that had land areas over 400 $km^2$, 20 were over 1000 $km^2$. Among them, the Yellow River Delta Efficient Ecological Economic District (New District) is the largest with a total land area of 26,500 $km^2$. Among the 20 new districts that are over 1000 $km^2$, 13 are in the eastern coastal regions, 6 are in Western China, only 1 in Central China, which does agree with the general urbanization spatial pattern that the eastern coast develops far more rapidly than the rest of China.

In the constructed new urban districts, the areas tend to be too large as well. For instance, in 2010, the planned Jinan New District of Hebei Province eventually covers 1215 $km^2$. Chengdu's Tianfu New District (planned in November, 2011) reached 1578 $km^2$. The Guizhou-Anshun New District (planned on March, 2012) was 1500 $km^2$. Maomin Binhai New District (planned in April, 2012) was 1688 $km^2$. Dianzhong Industrial New District (planned in October, 2012) was 1149 $km^2$. Guizhou Yilong New District (planned in November, 2012) was 1324 $km^2$. Yinchuang Binhe New District (planned in March 2013) was 1200 $km^2$. Fuzhou New District (planned in January 2014) was at least 2500 $km^2$, which is more than tens of times that of Fuzhou city's proper area.

#### 1.4.2.3 Construction of New Urban Districts Often Is Too Hasty

Sometimes the urban Master Plans have to be forced to accommodate to the new districts to legalize its existence or associated activities. Since most new urban district eventually exceeded the approved land area limits, the local governments

have to "repair" their Master Plan to legalize the exceeded land area. In so doing, it often makes the new urban districts larger than the old cities, wasting limited urban land resources. For instance, the Datong Xudong New district construction (approved for 42 $km^2$) reached 180 $km^2$, which is even more than the 127 $km^2$ land use limit by 2020 approved by the State Council. To legalize the exceeded land use, in 2011, Datong city "repaired" its Master Plan, and adjusted land use standard by 2020 to be 195 $km^2$. Such "forced repair" of the Master Plan is not unique in Datong, but becomes a semi-standard way to attempt to accommodate unsustainable activities to the legal framework, which strongly suggests that legalizing and enforcing urbanization related land use and construction legislation is imminent and critical. Otherwise, sustainable urbanization will become just words.

#### 1.4.2.4 The Construction Systems of the New Urban Districts Are Often Rather Complex, and Often Contradict with the Main Cities and Their Functions

The general developing mode for new urban districts follows a standard procedure. First, some city development and investment company (owned or share held by the local governments) served as a principal investor. The Party Committee and Management Committee were established as government agencies to manage and give land acquisition, bank credit, tax and other financial benefits and support policies to these investors. In reality, there are different management modes, which often have rather complex relationships with the main cities. Most new urban districts broke the original administrative divisions, complicating the coordination between the new districts and the main cities. Such complication somehow intensified the conflict of interests and management between the new and old urban districts. From a geographical point of view, the majority of China's existing new urban districts are close to the main city to maintain close ties with the divisions and functions. There are also the so-called "enclave" new urban districts that are far from the main city, such as the Ordos Khambashi District, Lanzhou New Area etc., mainly due to the lack of land resources in the immediate vicinity. From the perspective of administrative division, there are a few different modes between the new and old urban districts. The first is the "one" mode, such as Shanghai Pudong, Tianjin Binhai, Zhousan Islands, etc., that the new districts are but newly added districts of the main cities. The second is the "nested" mode in that the new districts are actually within existing old districts, such as East Zhengzhou New District, West Teilin New District. The third is the "integrated" mode because the new district actually is a combination of different parts of various existing districts, such as the Two-Rivers districts, which contains part of Jiangbei, Yubei, and Beipei districts; or Xi'an-Xianyang and Tianfu New Districts, both covers over multiple existing counties, municipals and districts.

#### 1.4.2.5 New Urban District Constructions Are Often Mistaken as People-Oriented Platform for New Urbanization

Many local governments are still mistakenly believe that the New Urbanization is to "rush" the farmers into the city, which would mean more land will be needed for construction, and the added construction land means that new urban districts are needed. Following this train of thoughts, the local governments hence believe building new urban districts is the Silver Bullets to promote New Urbanization. Such outdated thinking patterns of urbanization naturally led some local governments eagerly to be included in the national pilot projects of New Urbanization. They would attempt to advance their urbanization level by expanding on new urban districts via being in the pilot projects. Once the State urban development plan was introduced, the local governments would begin to compile the overall urban planning or new master plan to expand the construction areas. Some local governments even consider New Urbanization as a "golden opportunity" to acquire even more lands for urban uses. In so doing, construction of new urban districts is mistakenly considered important carrier and platform for "New Urbanization." Under the auspices of New Urbanization, the proposed new urban districts often consume large-scale land resources, which eventually results in large number of high quality arable land being occupied and wasted, and large number of farmers being driven into the city and became the so-called "three noes" farmers (no land, no job and no social security). Few have attempted to understand the connotation of New Urbanization from the start and even fewer treat the elevation of urbanization quality as a top priority. Apparently, these approaches are directly against the principles of New Urbanization as proposed in the Party's "Eighteenth Congress Report" to go intensive, green, and low-carbon, and actively and steadily push forward people-oriented development mode.

### *1.4.3 Reasons for Unplanned Constructions and Expansions of New Urban Districts*

#### 1.4.3.1 Analyzing the Principal Contradictions of Blindly Building and Expanding New Urban Districts

Construction of the new urban districts in China has entered a new stage. New urban districts are generally large in numbers, multi-level, and widely distributed. There was a certain degree of "new urban district frenzy." While we do admit the positive role of new urban districts construction in China's urbanization and urban development, we must also face the existing problems, attempt to solve them, and guide effectively the new urban district construction to achieve healthy and sustainable urban development. These problems are as follows.

First, some of the new districts are proposed and approved, but never get constructed, which are in direct contradiction to the land use master plan. In the new

round of new urban district construction, the planned new district area keeps increasing. Some even covers land that are more than the existing urban built-up area, reaching thousands of square kilometers; while still some also propose the development of multiple new urban districts at the same time. Some of these new constructions are inconsistent with either the overall urban planning, or the land use planning. Such constructions often take up a lot of agricultural land, arable land and basic farmland. Many large-scale new urban district constructions continue to follow the traditional "overspreading" type of extensive development mode, causing both the loss of arable land, and wasteful and inefficient use of land resources [19]. In addition, planning of large area new urban district often leads to the prevalence of occupying instead of building upon the lands. Many cities even seek favorable national policies in terms of taxation and land use etc. under the disguise of construction of the new urban districts, ignoring the global and long-term interests.

Second, the new districts tend to copy instead of extend the functions of the main cities, which is against the principles of the urban Master Plan. Many a time, constructing new urban districts in contemporary China is but a misnomer. "New" is not necessarily new in terms of supporting and complementing the main city. The "new" districts and the main cities have great resemblance. Construction of the new urban districts is largely just a strategic makeshift to ease the housing, transportation, and the enormous resources and environment pressure of the old town. The functions of the new districts and the main city are gradually converging. In the strict sense, it is hard to completely distinguish the new and the old. Apparently, this phenomenon is causing serious repeated construction and tremendous waste of resources, thus gives the local governments heavy burden on local finances, commuting, and management. Some of the new urban districts are far away from the city center, resulting in extended working related commute, increasing traffic pressure. For example, the Khambashi new district of Ordos is 30 km away from the city center, Dongsheng District. This separation results in a large part of the urban residents "living in the old district, but work in the new district." The situation has greatly increased the urban commuting time and urban traffic volume. Severe traffic congestion and car exhaust pollution are directly related with this scenario.

Third, the construction of the new urban districts is often ahead of being necessary, which then leads to severe waste of infrastructure capacity. Comparing to the enthusiasm of constructing new urban districts, oftentimes the total population size in the new urban districts is fairly small except for a few national level new urban districts. Most of them have population in the hundreds of thousands range. Some new urban districts have fewer than one hundred thousand people. In extreme scenarios, there are less than ten thousand people living in the new urban district. The small population size not only restricts the construction of transport, water supply, electricity, information, sewage and waste disposal and other infrastructure, but also causes the existing infrastructure to be wasted and inefficient. Moreover, the small population size doesn't help business, education, health care, catering, and entertainment facilities enter the new districts. It is also difficult to meet continuously expanding and upgrading consumer and service demands, resulting in a lack

of popularity and commercial atmosphere in a very long time, contrary to the goals of building the new districts to start with.

Fourth, the industrial foundations in the new urban districts are often too weak to support sustainable economic growth. For the new urban districts that are currently under construction, their industrial foundations fall within three categories. The first category relies on the industrial base of the main city and expands on it. The second category relies on various levels of industrial development zones. The third category has no industrial base, and needs to build their industrial systems from scratch. Although the local governments have formulated detailed development plans for the new urban districts, there are always uncertainty and risk factors in investment, industry selection, competition with the main city, etc. A considerable amount of the new urban districts have difficulty to form a competitive industrial system right away due to relatively poor infrastructure, lack of industrial supporting capacity, or poor correlation with existing industries. This creates a vicious cycle that the new districts cannot create stable jobs and attract enough people to stay, which causes the production and service functions hard to be developed, again this leads to the development of the new districts to be lack of intrinsic motivation and effective support [7].

Fifth, aimless investment and construction seriously increased local governments' debt risk. The development of the new urban districts involves a full range of infrastructure constructions, including land acquisition, house demolition, road construction, water, electricity and heat supply, information networks, sewage and garbage, ecological greening, etc. It will always generate huge demand for investment. At the same time, both developing new industries and upgrading traditional industries require large amount of capital investment, which requires the new urban districts to have innovative ways to attract them. Some cities frequently ask for several hundred million or even several hundred billion RMB Yuan to finance the construction and development of their new urban districts, far beyond their own financing capacity. This hence forces the cities to finance through local government financing platform companies, leading to explosive increase of such companies, soaring debt scale, and increasing risk of local debt. According to research statistics, as of the end of 2010, there were more than ten thousand local government financing platform companies. The local government debt balance was over ten trillion RMB Yuan. The large projects in the new urban districts often involve a long payback period of investment. Some industries and fields have large scale of debt liabilities. Some local governments are fairly weak in terms of revenue generation and assets realization. Still some local governments rely heavily on land transfer income to pay off the debt. Some even have to borrow new debt to pay off the old ones, inevitably increasing the potential risks of local governments' debt [19].

Our field studies found that many local governments applied the so-called Chinese-style urban development mode (i.e., selling the land and developing with debt) to the extreme. Some local government leaders do not have sufficient knowledge of the investment. Some projects were approved and launched without adequate scientific feasibility studies, creating many so-called "impulsive" new urban districts. Selling land usage to finance (land finance) new urban district construction has become a common development model in China in recent years. However, due to the

huge amount of required investment to successfully construct the new urban districts, land finance alone is not sufficient. Loans and financing via other platforms are required, which results in drastically increased debt risks of local governments. By the end of 2010, according to data released by the audit department, the debt ratio of many provinces may have exceeded 100 %. In 2011–2012 years, there are nine provincial capital city governments having debt ratio over 100 % that they are responsible to repay. The highest is 189 %, far exceeding the 20 % debt ratio suggested by the Audit Commission and international conventions. Other cities also have various debt ratio, but most of them are way above the 20 % cordon. For instance, the government of Datong has a debt ratio of 200 % due to construction of new urban districts. Xi'an Qujiang's debt ratio reached 66 %. Tangshan Caofeidian's new urban district has a debt over 60 billion RMB Yuan, resulting in forced shut-down of many large-scale projects. The growing amount of local debt leads to increasing risk of debt crisis, which might further exacerbate the already tight capital chain to the breaking point. Proposing the mode of New Urbanization needs to pay very close attention to such potential crisis. After all, the bankruptcy of the US city, Detroit serves as a good example if we are not fully prepared.

#### 1.4.3.2 Reasons Why New Urban District Constructions Are Often Too Large, and Too Rushed

From our studies, there are in general five reasons.

First, lack of authoritative regulatory agencies leads to too much freedom in proposing and launching new urban district constructions. One critical issue in China's new urban district construction is that many extensive and wasteful new city district construction plans still get approved without slowing down. This is because as of now, China doesn't yet have an authoritative regulatory agency to oversee new urban district construction. Questions like, "which cities really need to build a new district?" "how much should be built?" "where to build?" "which cities need to build national level districts?" "which need only provincial and municipal level districts?" "how many are needed?" and the like, were never asked, answered or monitored. Due to the lack of such authoritative agency to monitor and evaluate, answers to all the above questions are often determined impulsively by the local governments, with plenty of room for expansion discretion, which leads to very arbitrary and random decisions regarding new district constructions. The fact that many cities have to adjust (forced repair) their Master Plans after the new urban districts were built up is but one example of such arbitrariness and randomness.

Second, urban planning failure also leads to new urban district construction to bite off more than it can chew. Driven by a strong local government, many of the planning and design departments simply took orders from the leader's will without sufficient scientific analysis or feasibility studies. The so-called urban planning is but a reiteration of the new urban district that has been delineated by the government beforehand. Questions like how much is the reasonable size; how many people the new district will be accommodating, what will be the economic output,

and whether there is appropriate resources and environment carrying capacity, etc., were either never asked or ignored because the government doesn't have sufficient knowledge to care. In the planning and design process, the government often keeps changing the size and scale of the new district, sometimes even imposes personal intent, resulting in impulsive and failed planning which eventually leads to the new district construction to be out of control.

Third, local governments rely too much on land financing, which also expedites the new district construction. Our studies found that, under the existing fiscal system, about 30–35 % of prefecture-level cities' revenue, and about 50–70 % of the county-level cities and county's revenue comes from land and real estate development income. This is typical land finances. Once the government stops to transfer land usage right, the government could be "weaned" and the local fiscal system could even crash. In order to avoid financial crisis, the government will do everything possible to sell the land through a variety of ways. Since the old town often has very little land to transfer, developing new district become a natural choice, which also leads to rapid construction of new urban districts. From this aspect, it can be seen that a vicious cycle of land finance dependence and the debt crisis is the fundamental motivation for building more and big new urban districts.

Fourth, the regulatory loophole also encouraged and spawned the constructions of new urban districts. The national New Urbanization plan proposed that by 2020, the average national urbanization level will reach 60 %. To provinces, cities and counties that currently have lower urbanization level, 60 % became a benchmark. The simplest way to reach the benchmark, to these local officials' understanding, is to quickly move the farmers into the city, which makes construction of the new urban districts necessary. In general, there are two ways to increase construction land: The first is a proper way by revising the overall urban planning, which is regulated by *Town and Country Planning Act*. Once the revision is properly evaluated it can be determined whether it will be approved. Even if it is approved, the revision cycle is long, slow, and the total increase is limited (this is because during the planning period, new construction land area cannot exceed 20–30 % of the current built up area). So the proper way was rarely used. The second way is to bypass the *Town and Country Planning Act* and other regulatory constraints, the government will determine the revision in the form of the minutes of government executive meetings. The decision to start building all types of new districts will then need no assessment, no approval, everything is then "what they say goes." This government monopoly procedure of first acquiring and occupying the land, then attract the investors, and then start the production, and finally fill out construction land approval procedures is the very source of all of the chaotically proposed new urban district construction. If this loophole was not blocked, the chaotic and blind expansion and construction of new districts would not stop [20].

Fifth, the impulsive action due to performance evaluation and the inertia thinking of image project also facilitate the chaotic launch of new urban districts. For a relatively long period of time, China's cadre performance evaluation and career advancement are closely associated with major economic data and economic indicators. Driven by this evaluation mechanism, the inertial thinking of

government-led district construction was deeply ingrained. Under such mindset, many governmental leaders dare to make final decision of new construction without proper analysis and feasibility study. Some might even stuck in a "vicious circle" of expanding the new construction and finding ways to financing it. In addition, various administrative units (at the same level) tend to compete with one another in terms of new district construction without any consideration of local conditions. They often treat the construction as image project, "number 1 project," and even "political tasks." This leads to the new district construction to be severely detached from reality, and causes serious waste of land and financial resources.

### *1.4.4 The Scientific Path for Appropriate New Urban Districts Construction in China*

From the above discussions, we can see that new urban district construction is an important means of promoting the New Urbanization, but not the only means. For successful and meaningful construction of new urban district, we need to plan from the national strategic level with scientific guidance and propose rational distribution. Construction conditions vary widely across cities in China. The imbalance is very prominent. It is then necessary to prohibit a "one size fits all" strategy in constructing the new urban district. On the other hand, however, random and arbitrary construction needs to be curbed as well so that the new urban district will not become another excuse for local government to exploit land finance. To achieve such goals, we propose six approaches and suggestions.

#### 1.4.4.1 Establishing a National Level Comprehensive Evaluation Agency and Mechanism for New Urban District Construction, with Strict Examination and Approval Procedure that Everyone Must Follow

From a strategic perspective of the security of national socioeconomic development, a good and uniform national top-level planning and design procedure for new urban district construction is critical. Important questions such as how many national level new urban districts are really needed from the perspective of the whole country; what would be the construction standards; and what national and/or regional functions the new districts will be charged with, shall be considered prior to launching any new constructions. We hence recommend the establishment of a review mechanism and comprehensive assessment review committee for new urban districts. The primary tasks for the committee are to evaluate the necessity, rationality and feasibility of constructing new urban districts based on rigorous scientific principles and analyses. The committee will generate reports to provide decision support as to which new district constructions shall be launched, and

which ones shall be put on hold. In addition, the committee will also provide suggestions to the goals, scales, strategic layouts and investment priority for the national level new districts. Each province can establish similar review mechanism and provincial level review committees to determine the goals, scales, spatial layouts and investment priority for the provincial level new districts. In so doing, the local governments can avoid the commonly existed "impulsive" decision as to whether new districts shall be constructed or not. We must learn the lessons from Caofeidian, Hebei Province's failure to ensure that constructions of the new urban districts are well managed and under control.

#### 1.4.4.2 Develop Practical Measures for Rectification of the Various New Districts that Are Either Under Construction or Planned to Be Launched

China is now facing a new wave of "expanding and launching new districts," which would eventually lead to various problems as outlined previously. To avoid such consequences, we suggest that governments at various levels shall follow strictly the review reports produced by the comprehensive assessment review committee for new urban districts. They shall take timely measures to straighten out various new districts based on the needs of urban and industrial development, and local resources and environment carrying capacities, be they under construction or planned to be launched. If the new districts are deemed worth constructing, their functions, construction scales and leading industries shall be determined based on scientific analyses and feasibility studies. The new districts shall be included in the land use planning and urban master plans in strict accordance with *Land Management Law* and *Town and Country Planning Act*. Construction of the new urban districts shall be precisely converged to the build-up area as outlined in the urban master plans. For any new districts that exceed the prescribed area, they must be rectified within set period of time. For any new districts that are about to exceed the planned area, their construction shall be stopped immediately. The individuals who ignore the carrying capacity of regional resources and environment, enlarge at will the construction area, arbitrarily acquire the basic farmlands or change the basic farmlands to be regular farmlands and then acquire them for new urban district construction will be punished accordingly. To ensure that the insurmountable red line of 1.8 billion mu basic arable lands will not be encroached, we propose that the urban planning and land administration departments at all levels apply strict measures on land use change clearance and expansion, and implement the most stringent land management system. The measures must be strictly followed and independent from the leading officials' personal influence to prevent them from occupying land for new district construction or changing counties (rural administration) to districts (urban administration) based on the excuses of rural-urban integration or practicing scientific development. In so doing, the measures will also prevent the leading officials from depriving of the rights for development of the

grassroots local governments, and the so-called "building but not operating, occupying but not using" phenomena from happening.

It is absolutely critical to further unify and clear the type and definition of urban new districts. Strict measures must be taken to prevent arbitrary set-up, claim or rename new urban districts at various levels. In addition, it is also necessary to establish scientific processes and approval procedures, and stress the importance of assessment and public announcement for developing new urban districts. Higher level governments shall take necessary responsibility to approve and monitor the applications for new urban districts constructions. In principle, only the State Council and provincial governments shall have the authority to approve or disapprove proposals for new urban districts construction. Other levels of governments shall not have such authority. In so doing, we are able to control the number of new urban districts from the institutional perspective. Governmental departments of planning, land, environmental protection, industry, development and reform at the same level shall establish a consultation and countersigned system. The supervision functions of the same level People's Congress, People's Political Consultative Conference, social organizations and news media need to be strengthened to ensure the democracy of new urban district construction, hence improve the quality of the approved ones.

#### 1.4.4.3 Scientifically Plan the New Urban Districts, Follow the Principles of "Launching if Needed, Implementing Within Limits, and Building According to Available Land"

On one hand, we suggest the central government compiling a national level master plan for new urban districts, completing its top level design, strictly setting up the scale and number of new urban districts at various levels. On the other hand, the national level comprehensive review assessment agency shall be able to determine the cities that are in urgent need for new urban districts under the guidance of the master plans. They shall then be able to provide high standard scientific plan suggestions for those cities. Under the guidance of such plans, it shall be possible to properly handle the industrial spillover and expansion, functions complementation, transportation connection, population diversion, and interdependence of infrastructure and public service facilities between the old and new urban districts. The plans shall also provide guidance to deal with the complex administrative relationships between the old and new districts to prevent the recurrence of the phenomena that "new districts empty out the old cities or new districts become empty cities." [21]

One important point for new urban district construction is that it can serve as an important experimental platform to coordinate the so-called "three-planning," namely, regional development planning, land use planning and urban master planning. Successful implementation of the new urban districts will provide promising guidance to mitigate the lack of coordination among the "three-planning." It will also suggest new approaches and technology paths for

coordinated guidance of urban new district construction, and eventually improve the industrial concentration and land use intensiveness in the new urban districts.

#### 1.4.4.4 Optimize the Construction Land of the New Urban Districts by Rational Use of Land Change Link Mechanism

Land change link mechanism was originally designed to promote coordinated development of urban and rural land use changes, improve the land use efficiency and mitigate urban land use shortage. It was misused, however, by some local governments as an important mechanism to change the new urban district areas arbitrarily. Using this land change link mechanism, some local governments pour all the vacated lands from the county-level cities and townships towards new urban districts, which somehow induces the land use conditions for new urban districts. We suggest that the local governments using such mechanism reasonably. Instead of concentrate all the newly added lands onto new urban districts construction, they shall be reasonably reallocated among the new urban districts, county-level cities, townships and even rural communities.

The new urban district construction shall effectively integrate the various scattered land use functions. This way, it will be able to properly deal with the prevailing problems of extensive land management and low extent of spatial accumulation in new urban district constructions. The spatial distribution of the new urban districts shall follow the principles of relative concentration with proper dispersion, and utilizing the public transportation to guide urban development [22]. In addition, the new urban district construction shall follow a smart growth mode that emphasizes on mixed land use and intensive development strategies, and focuses on compact urban construction land planning. New development should make full use of existing urban space and strengthen the redevelopment of existing built-up areas. In so doing, it is able to reduce the cost of infrastructure and public service facilities, and protect open spaces. By integrating various types of urban land, building compact new districts, it shall improve the efficiency of intensive land use for the new urban districts [23].

#### 1.4.4.5 Build the New Urban Districts to Be an "Integrated City and Industry" Area

For a long time in various cities in China, the various industrial development zones are often built with a general lack of personalized services and residential functions. Such zoning setup hardly satisfies the citizens' overall development needs, and is also not conducive to intensive and economical use of land resources. The new urban district is not a development zone. Construction of the new urban district shall take the route that integrates urban and industrial, housing and working, and focus on the coordinated development of urban functions and industrial capabilities. The new urban districts will eventually become an integrated space of New

Urbanization and new industrialization. Experiences from overseas suggest that industrial development is increasingly valued as a primary support for urban development. For instance, new urban districts in London, Tokyo, Hong Kong, Paris and many other cities have developed under the government planning guidance to become new cities with strong industrial capability. Development of the new urban districts needs to quickly form integrated urban community functions. The core is to promote industrial growth within the city. Therefore, we must cultivate the industrial clusters of the new districts for the agglomeration effect and build the core area for the new urban district development [24]. The new urban district should be committed to developing modern tertiary industry such as real estate, finance, insurance and consulting, and high-tech industries. In the meantime, the new urban districts shall also promote the upgrading of existing industries and become the city's new economic growth pole.

#### 1.4.4.6 Establish a Scientific View of Political Performance; Curb the Political Impulse to "Hasten" New Urban Districts

For a long time, driven by the economic indicators, and the one-sided view of achievements and evaluation mechanism, the inertia thinking and practices of government-led impulsive urban construction are yet to be broken. In order to curb such trends of blind and impulsive construction, we propose to reform the current performance evaluation system. Combined with the ongoing practices of mass public education, and the democratic meetings among various levels of government leaders, it is important to change their perspectives of political performance. In so doing, it is hoped to convert the negative effects of the impulse to positive energy to promote scientific development and improve citizens' livelihood. If we are able to correctly understand the connotation of "people-oriented" nature of the New Urbanization, rationally, gradually and orderly guide the construction of the new urban districts, gradually defuse the debt risk for local governments, and continually improve the quality of urban development, construction of new urban districts will then play an important role in promoting the New Urbanization in China for the following decades.

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# Chapter 2
# The Developmental Strategies and Basic Principles for China's New Urbanization

The developmental strategies and basic principles for China's New Urbanization are the general guidelines for sustainable and healthy urbanization. These strategies and principles are not set in the stone. Instead, based on the different characteristics of urbanization in the four different stages, there shall be corresponding strategies and principles to guide urbanization in these stages. In this chapter, we will first review the various strategies and principles that guided China's urbanization during the past 60 plus years. We will then summarize the drawbacks and limitations of the current developmental strategies, and propose the basic principles, strategic changes of direction, and path based on the new historical conditions that China is transforming from traditional urbanization to New Urbanization. The New Urbanization will specifically focus on "high efficiency, low carbon, sound ecology, environmental protection, conservation, creativity, intelligence, and peace." The changes include from urbanization of numbers to urbanization of quality, from radical to gradual urbanization, from passive to active urbanization, from land-oriented to people-oriented urbanization, and from government-led to market-driven urbanization. The ultimate goal of the New Urbanization is to turn urbanization from focusing on speed to quality, and from being sub-healthy to healthy. Needless to say, without such strategic changes and transitions, China's urbanization will be unsustainable and eventually go off track. From our analyses, discussions, and field work experiences, we finally propose the strategic principles for China's New Urbanization, which include the following two aspects. First, we need to strategically guide the development and formation of urban agglomerations. Second, the development of mega- and supercities must be strictly controlled, though rational development of large cities is acceptable. Development of medium-sized cities shall be encouraged. Small cities and townships shall be the foci of New Urbanization. The ultimate goal is to form a new spatial urban pattern that is a coordinated development among urban agglomerations and large, medium, small cities, and townships.



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## 2.1 Fundamental Meaning and Strategic Background of China's New Urbanization

### *2.1.1 Comparison of the Fundamental Meaning Between New and Traditional Urbanization*

The traditional urbanization is basically a so-called "three-highs-with- one-low" type of urbanization. Specifically, the three highs are high resources consumption, high carbon, and high pollution. The one low means low efficiency. This urbanization focuses primarily on the speed of urbanization, and too much on making money from land rentals. Overall, the traditional urbanization is land-oriented, number-oriented, passive, radical, and government-led urbanization. The obvious "negative effects" of such urbanization are the increasingly severe urban diseases. This is typical unhealthy and unsustainable urbanization, and contradicts with China's strategic goals of building a moderately prosperous society and sustainable modernization (Table 2.1).

The New Urbanization, on the other hand, is almost everything the traditional one is not. Specifically, the New Urbanization stresses high efficiency, low carbon, ecologic and environmental protection, conservation and creativity, and intelligence and peace. Sustainability is the core of the New Urbanization. It seeks the improvement of urbanization quality instead of quantity. It is people-oriented (instead of land-oriented). It is a comprehensive, quality-oriented, active, gradual, and market-driven type of urbanization. Contrary to the traditional style, the New Urbanization releases "positive energy" that promotes urban sustainability, and hence is healthy. The New Urbanization fits with China's strategic goals perfectly.

To actually change from China's traditional to the New Urbanization, we propose a few strategic transitions. First, urban traffic shall change from automobile automobile-dominated to non-automobile (bicycle)-oriented. Second, urbanization shall focus more on quality instead of quantity. Third, urbanization shall follow a gradual path instead of a radical one. Fourth, urbanization shall release more "positive energy" instead of "negative effects"; hence, we have active instead of passive urbanization. Fifth, urbanization shall change from land-oriented to people-oriented, from government-led to market-driven so that urbanization serves the people instead of governmental officials (for their political performance report cards). The ultimate goal of these transitions is to ensure successful implementation of China's quality-oriented and sustainable New Urbanization. We believe it is imperative for China's urbanization to follow these transitions in the next few decades so that Chinese cities can develop sustainably.

**Table 2.1** Comparative analysis of the essential differences between the new and the traditional urbanization

| Content | New Urbanization | Traditional urbanization | Strategic path |
|---|---|---|---|
| Urbanization level | Quality-oriented urbanization, moderately suitable speed, focuses on the quality and speed at the same time | Number-oriented urbanization, focuses primarily on the speed of urbanization | From number-oriented to quality-oriented |
| Core of urbanization | People-oriented | Land-oriented | From land-oriented to people-oriented |
| Driving factors | Innovation-driven and smart-driven | Resources-driven and capital-driven | From factor-driven to innovation-driven |
| Driving pattern | Intensive economic growth pattern featured with "three-lows-with-one-high," low resources consumption, low carbon, low pollution and high efficiency | Extensive economic growth pattern featured with "three-highs-with-one-low," high resources consumption, high carbon, high pollution and low efficiency | From extensive pattern to intensive pattern |
| Urbanization path | Gradual urbanization step by step | Radical urbanization at one step | From radical to gradual urbanization |
| Urbanization process | Comprehensive urbanization, including the urbanization of land, population, economy and society, etc. | Land-oriented urbanization, too much on making money from land rentals | From single factor to comprehensive urbanization |
| Urbanization subjective | People-oriented, active urbanization | Officials-oriented, passive urbanization | From passive to active urbanization |
| Urbanization orientation | Market-guided urbanization | Government-guided urbanization | From government-guided to market-guided urbanization |
| State of urbanization | Healthy urbanization, sustainable development | Unhealthy urbanization, increasingly severe urban diseases | From unhealthy to healthy urbanization |
| Urbanization prospect | Sustainable urbanization, urban sustainability | Unsustainable urbanization, increasing urban vulnerability | From unsustainable to sustainable urbanization |

## *2.1.2 Strategic Background for Promoting New Urbanization*

### 2.1.2.1 The Central Government Made Specific Plans for Implementing New Urbanization in the First Urbanization Working Conference

The Urbanization Working Conference on December 12, 2013 was the first time the central government recognized urbanization as a strategic milestone for China's modernization and sustainable development. Implementing New Urbanization would also serve as an important means for sustainably dealing with mounting issues (such as underemployment, land degradation, etc.) in the agricultural section and rural areas, supporting regional coordinated development, increasing domestic demand, and upgrading industrial structure. In short, New Urbanization is an integrated component of the New China Dream. In the conference, scholars and governmental officials together analyzed the developmental trend of China's current urbanization, and proposed the guiding ideology, primary goals, basic principles, and key tasks for New Urbanization. The conference attendees agreed that urbanization is a natural historical process, an integrated part of China's socioeconomic development. To this regard, urbanization shall proceed based on the recognition of the historical conditions that China is still in its primary socialism stage. Specifically, urbanization shall proceed vigorously, securely, and firmly. The goals of urbanization shall be clear, the steps stable, and measures instigated. New Urbanization will focus more on the quality of urbanization, the development for people, the improvement of employment opportunity and conditions, and eventually increase the quality of life in cities. The spatial structure of China's New Urbanization will be based on the spatial distribution of resources and environmental carrying capacity. Urban agglomerations are at the core, large, medium, and small-sized cities and townships are distributed in a coordinated hierarchical structure that they support and supplement one another. In the conference, the attendees also proposed six major tasks for China's New Urbanization, namely, urbanizing rural population, improving urban land-use efficiency, establishing diversified and sustainable financial security system, optimizing urbanization spatial structure, improving the urban construction level, and strengthening the management of urbanization. This new sustainable urbanization will eventually be a great force to promote China's sustainable socioeconomic development and all citizens' China dream.

### 2.1.2.2 The Communist Party's "Eighteenth Congress" Report Promotes Chinese Characteristic New Urbanization

In the "Eighteenth Congress" report in November 2012, the Chinese Communist Party (CCP) specifically promoted a Chinese characteristic development path for new industrialization, information technology, urbanization, and agricultural

modernization. The path was characterized by promoting deep integration of information technology and industrialization, positive interaction between industrialization and urbanization, and coordinated development between urbanization and agricultural modernization. The goal is a synchronized development for industrialization, information technology, urbanization, and agricultural modernization. To achieve these goals, the report indicated that we needed to improve the institutional mechanism for the integration of urban and rural development. Specific efforts were also needed to promote integration in terms of urban planning, infrastructure, and public services. The integration shall facilitate fairer exchange of development factors and better allocation of public resources between the cities and the rural areas. The goal is to create a harmonious industrial–agricultural and urban–rural relationship in which industrial development will facilitate the development of agriculture, and urban development will benefit the rural development as well. The report also stressed the importance of promoting ecological civilization and optimizing the spatial distribution of land-use patterns. The fundamental principle of the New Urbanization is to urbanize in a sustainable way so that the development of the cities will not come at the expense of the rural and natural landscape. The development of society and economy, allocation of resources, expansion in space, and exploitation of the environment shall proceed within limits. Within the cities, we shall fully implement the strategy of establishing main functional areas and developing the cities around these areas focusing on their primary functions. The report concludes that the future urban landscape in China shall be scientifically guided, fully supporting agricultural development and having secure ecological and environmental capacity.

#### 2.1.2.3 The Central Government's Economic Working Conference Defines and Promotes the Compact, Intelligent, Green and Low-Carbon Mode of New Urbanization for Two Consecutive Years

In both Decembers of 2012 and 2013, the Central Government's Economic Working Conference stressed the importance of promoting New Urbanization, focusing on urbanization quality. Urbanization was regarded as the nation's historical task, and the most promising process to increase domestic demand. The New Urbanization will focus primarily on improving urbanization quality instead of seeking for higher numbers. Development of cities shall respect local conditions. The spatial pattern of China's urban landscape shall follow a scientific guidance in which the distribution of large, medium, and small-sized cities and townships must agree with the existing regional economic and industrial distribution pattern, and the scale of development must be within the environment and resource carrying capacity. One of the primary tasks is to steadily and gradually urbanize rural population. The connotation of urbanization will no longer only mean increase in population and economic gains, but also embed ecologic security and

environmental sustainability. The New Urbanization shall be compact, intelligent, green, and low-carbon.

#### 2.1.2.4 The Communist Party's Third Plenary Session of the Eighteenth Congress Promotes the Establishment of Healthy Urbanization Development Institutional Mechanisms

The CCP Central Committee's Decisions on Comprehensive Deepening of the Reforms of Major Issues, passed on November 12, 2013, explicitly stated that establishing harmonious and sustainable human–land relationship is the fundamental task of the nation in the new era. The reform shall now be extended to stress China's ecological civilization and establish proper institutional mechanisms for ecological civilization and sustainability, which will further promote better land development practices, better resource conservation, and better protection for the environment and ecologic systems. The local government shall change their roles and functions from administrator/manager to more like entrepreneur. The current financial and taxation system needs to be further reformed to facilitate the integration of urban and rural development and establish a new open economic development mechanism. A new integrated urban–rural and industry–agriculture relationship will be established so that development of industries and cities will facilitate the development of agriculture and rural areas. The traditional urban–rural two-tier spatial structure will be broken so that farmers can participate and share the benefits of the socioeconomic development and society modernization equally as their urban peers. The farmers will be given more financial freedom and property rights. Market mechanisms will be established to ensure fair exchange of production factors and allocation of resources between the urban and rural areas.

#### 2.1.2.5 The State Council Approved the National New Urbanization Plan 2014–2020

In March 16, 2014, the State Council of China approved the implementation of the National New Urbanization Plan 2014–2020 (Plan henceforth). The plan was established based on the eighteenth Congress Report, CCP Central Committee's Decisions on Comprehensive Deepening of the Reforms of Major Issues, Central Government's Urbanization Working Conference, and the Twelfth Five-Year Plan of People's Republic of China for National Economic and Social Development, and the National Main Functional Area Planning. The essence of the plan is to stress the development of Chinese Characteristic New Urbanization, focus on urbanization quality, clarify the development path, primary goals and strategic tasks for China's future urbanization, and coordinate relevant system and policy innovations. The plan will be the macro, strategic, and fundamental guidance for China's health urbanization in the future.

## 2.2 Strategic Transition of China's New Urbanization

### *2.2.1 Fundamental Principles for Transition to New Urbanization in China*

#### 2.2.1.1 Adhere to the Principles of People-Oriented, Highlighting Scientific Development

In the twenty-first century, the development of China's urbanization is facing the new requirement for developing new industrialization, building a moderately prosperous harmonious society, and promoting sustainably coordinated development of population, resources, environment, and economy. It is the essential requirement for China to implement its people-oriented and sustainably scientific development to accelerate the development of urbanization. Development of cities must be based on the carrying capacity of resources and ecological environment, and under the premise of respecting the laws of urbanization.

#### 2.2.1.2 Based on National and City Conditions to Solve "Urban Diseases"

The choice of urbanization modes in China must be based on the fundamental fact that China has too many people but too few lands, is experiencing industrial restructuring, and has enormous employment pressure. In addition, urbanization will also abide by local conditions. To deal with a range of urban disease problems occurring in the process of urbanization, including excessive speed of urbanization, being too large, traffic congestion, high housing prices, environmental pollution, uncontrolled expansion problem, and management system problem, the choice of China's urbanization must be delicate but swift, practical but reasonable, but most importantly, sustainable and always adjusting to national and local conditions.

#### 2.2.1.3 Urbanize According to Local Conditions

When planning for urbanization in different regions, we must realize their different levels of urbanization. In addition, since the current urbanization policies are administered at a national level, it is crucial to understand the regional differences, so that we can provide more appropriate guidance for different regions. Urbanization in different regions, hence, shall give full consideration to regional difference in establishing different main functional areas, different urbanizing paths of development, and urbanization patterns. We need to avoid engaging in "one size fits all" type of urbanization so that policies will not affect the healthy development of urbanization in different regions.

#### 2.2.1.4 Response Well to Global Competition and Focus on International Standards

Economic globalization shortens the economic distance between countries and regions, and impacts on economic development and urbanization patterns in every country in a variety of ways. In order to adapt to the new trend of global economic changes, and to address global urban competitiveness, regional central cities and large metropolis are accelerating their integration into the global network system [1]. Urban functions are becoming more international. Urban development mechanism and operating environment further upgrade with the international standards. Therefore, the choice of the urbanization paths must take full account of the impact of economic globalization on the development of urbanization in China, and focus on international standards. In the meantime, urbanization in China shall learn the lessons from other nations, and must not copy the development model of urbanization overseas, so that we will not wound up into the same detour of polluting first and control later.

#### 2.2.1.5 Push for Model Innovation to Ensure Healthy Urban Development

The New Urbanization model will focus on constant innovation of development mode and acceleration of the development of New Urbanization strategies. The tasks are to change the unsustainable traditional model of high resource consumption, high economic growth, high carbon emissions, and high pollution into efficient low-carbon, environmental protection, conservation and innovation, and intelligent and peaceful development model of sustainable and healthy urbanization. Appropriately handling the relationships between quantity- and quality-oriented, radical and progressive, passive and active, land-based and people-oriented, market-driven, and the government-led models of urbanization is critical to ensure the healthy and stable development of China's future urbanization.

### *2.2.2 Strategic Transition of New Urbanization: From Rate to Quality*

The traditional urbanization is often characterized as high resource consumption, high economic growth, high carbon emissions and high pollution, and hence unsustainable model. The New Urbanization, however, is an efficient low-carbon, environmental protection, conservation and innovation, intelligent and peaceful hence sustainable, and healthy development model. To ensure successful transition of China's urbanization from the traditional model to the new model, we need to achieve the following five strategic transformations. These include transformation

from quantity- to quality-oriented urbanization, from radical to progressive urbanization, from passive to active urbanization, from land-rental-based to people-oriented urbanization, and from government-led to market-driven urbanization. In so doing, the New Urbanization will ultimately change from focusing on the speed to the quality and changing from sub-healthy to healthy urbanization. Only by achieving these strategic transformations, China's urbanization will not go astray and be able to maintain sustainable, long-term, and prosperous development. We will elaborate the five strategic transformations below.

#### 2.2.2.1 Transform from "Car-Ride-like" (Focusing on Quantity) to "Bike-Ride-like" (Focusing on Quality) Urbanization

Healthy urbanization is supposed to be the integration of speed and quality improvement all around, and should focus on inherent integration of economic, social, and ecological benefits. Above all, urbanization quality shall take precedence over urbanization speed. If in the past the pursuit of urbanization speed and numbers can be considered as a "car-ride-like" process, then the New Urbanization process is more of a "bike-ride-like" process.

1. Quantity-oriented urbanization is a "car-ride-like" process that seeks only speed and numbers. "Car-ride-like" rapid urbanization process is assuming that the resources and environmental carrying capacity are unlimited, so that urbanization can accelerate boundlessly. The assumption is apparently flawed, especially under the current restrictions of resources and environmental carrying capacity. The fact that we are experiencing increasingly serious resources and environmental bottlenecks and high-risk urban diseases is but an inevitable manifestation of such false assumption. The "numbers game" as often related with China's urbanization shows that the "car-ride-like," quantity-oriented urbanization can no longer continue. Scholars argue that the value of the current level of China's urbanization is largely a number's game and not reliable. The real urbanization level in China might very well be less than 40 %. Hence we shall never get overexcited by what appears to be 50 % of urbanization in China. In the Eighteenth Congress Report and the Central Economic Working Conference, the central government proposed to actively and steadily promote urbanization, and strive to improve the quality of urbanization, so that China's urbanization can be intensive, intelligent, green, low-carbon, and sustainable.
2. Quality-oriented urbanization is a "bike-ride-like" process that seeks quality and overall benefits. If we treat the traditional pursuit of urbanization speed and quantity as a "car-ride-like" process, then the New Urbanization process can be characterized as more of a "bike-ride-like" process that focuses on quality. "bike-ride-like" urbanization process is an active and secure process, not too fast, not too slow. If it is too fast, the "bike" (urbanization) will crash; if it is too slow, then the "bike" will fall. The proper way of riding the bike is to balance the speed and rhythm. This new strategy calls for properly handling the

relationship between improving speed and quality. Improving the quality of urbanization shall be the top priority for the New Urbanization. The New Urbanization will gradually dilute the importance of numbers and speed, but strengthen quality assessment indicators. By shifting the national urbanization policies from focusing on quantity to quality, improving urbanization spatial, economic, and social quality, we will be able to alleviate urban disease problems to a minimum.

#### 2.2.2.2 Transition from Radical, Settled-at-One-Step, to Progressive, Step-by-Step Urbanization

1. The end of settled-at-one-step, radical urbanization. Radical urbanization stresses the quantitative aspect and speed of urbanization, emphasizing that urbanization shall be better if settled at one step. In particular, radical urbanization intends to absorb the rural population directly into the super-/megacities. This leads to quick population saturation (crowdedness) in super-/megacities and causes severe urban disease problems. In the early stages of urbanization, radical urbanization did play an important role in promoting urbanization, increasing necessary labor force for urban development, and providing a large consumer market. In the late stages, however, it becomes an unsustainable mode of urbanization as population, infrastructure, and resources can hardly be balanced. Transitioning from radical to progressive urbanization becomes imperative.
2. Promoting the "step-by-step" progressive urbanization. Progressive urbanization emphasizes the quality and efficiency of urbanization, stressing that urbanization shall be in place "step by step." Unlike in the radical version, rural population is gradually absorbed into the so-called "two smalls," i.e., small cities and small towns. Meanwhile, building new rural community is regarded as a primary approach of urbanization. Specifically, the rural villages will first build a center of the village that tends to absorb population. Once rural population is settling down, it will then be able to create rural communities and gradually build up to become small towns. After farmers turned to township citizens, various small townships will merge and combine to become small cities (county-level cities), which will further integrate and merge to become medium-sized city (prefecture-level cities). Such a step-by-step, progressive model of urbanization will have much less impact on the environment, less demand for radical land-use change and urban land expansion, and allow urban infrastructure to be sufficiently built to accommodate the population demands. In a nutshell, progressive urbanization stresses urban development principles that urbanization is a fair and just, step-by-step, sustainable process. Progressive urbanization emphasizes the growth of small and medium cities and small towns so that they will become the driving forces and development poles at different spatial scales for regional development. Moreover, progressive urbanization also stresses people-oriented

development, integrated urban and rural planning, balanced spatial distribution, enriched citizens, and prosperous township. The prominent tasks for progressive urbanization include improving citizen's quality of life, narrowing the development gap between urban and rural areas, and between rich and poor. Progressive urbanization process is an effective means to enhance the quality of urbanization, solve the urban disease problem, and a sustainable and healthy urbanization, especially in the late stages of urban development.

#### 2.2.2.3 From "Negative Effects" (Passive Urbanization) to "Positive Energy" (Active Urbanization)

1. "Negative effects" due to passive urbanization. The current urbanization in China is the path of passive urbanization. We term it passive urbanization because urbanization in China is mostly a government-led process, sometimes coerced by government administrative interference to reach certain "urbanization level" (number's game). Such "urbanization" often ignores the local conditions and local people's willingness. Although in the short term urbanization seems to reach new levels, and farmers became city dwellers. Yet, such urbanization almost always leads to landless farmers, under- or unemployment, stressed social security services, increased social instability, and reduced quality of life for all residents. Numerous cases have proved that passive urbanization ignored the fundamental development law of urbanization, and the farmers' approval for urbanization (just assumed that farmers all wanted to be "urbanized"). More importantly, some local governments and developers implement vigorous demolition through joint efforts to convert farming land-use to urban land-use, and change farmers to "citizens." Such passive urbanization led to a series of violation of residents' basic rights, and intensified the conflict between the government and farmers. Passive urbanization not only increased living burden of farmers, but also increased the risk of government debt, which leads to increasing negative effects. Some argue that China's urbanization is urbanization based on demolition. Apparently, passive urbanization is not people-oriented, which was directly against the goals of urbanization.
2. Active urbanization releases "positive energy." Active urbanization is a farmer-led, market-driven, and government-guided process. For active urbanization, farmers voluntarily propose the approaches for urbanization. The decision is made via collective self-organization within the rural communities. This urbanization process fully respects the wishes of farmers, and follows the principles of voluntary assessment, voluntary relocation, self-construction, self-financing, and self-management to promote urbanization. With active urbanization, farmers are allocated with certain retail shop fronts so that the farmers will have employment security after being converted to citizens. In the meantime, the newly urbanized citizens' social security will be embedded into the national urban social security system, enabling the newly urbanized citizens to

fully enjoy the city's infrastructure and public service facilities. This will effectively solve the various concerns and worries often occurred after farmers are urbanized. In addition, the rural collective organization will set up various forms of management companies, including collectively built farms, vegetable production bases, agricultural machinery storage bases, cultural and educational facilities, and recreational facilities. The collective organization will also facilitate the setup of various businesses with the newly urbanized citizens as shareholders to receive dividend of the business at the end of the year. With such active urbanization, the quality of life of the urbanized citizens shall be greatly improved. Their income level shall be greatly increased. Active urbanization, hence, will promote social stability and harmony, and continuously release "positive energy" which will drive the formation of a virtuous cycle of urbanization.

#### 2.2.2.4 From "Land-Rental Oriented" to "People-Oriented," from Land Urbanization to Human–Land Coordinated Urbanization

The New Urbanization in China is a synchronized process of population urbanization, land urbanization, economic urbanization, and social urbanization. The New Urbanization, hence, will promote the coordinated development between human beings and the environment.

1. The land urbanization which reaps revenue from land rental. The land-rental-oriented urbanization focuses primarily on making money by renting land in the process of urbanization. Apparently, under such mode, the only key for maximum benefit is to acquire more lands and rent them out. Under the disguise of enhancing urbanization level, the governments jointly work with various developers to rush the farmers into the city, and hence artificially increase the "level of urbanization" and require more land for that. In so doing, the local governments reaped a huge amount of land revenues. Because the land market is almost exclusively controlled by the government, the governments are able to rent the land to make money in the name of urbanization. In the meantime, the loss caused to farmers and issues concerning improving the living standards of farmers and other livelihood relevant issues were casually mentioned or ignored. In the traditional urbanization process, there was just too much emphasis on how to convert various types of land to urban land, which almost leads to endless urban sprawl without check. Apparently, such urbanization is but a one-sided understanding of the real urbanization that only focuses on converting rural land into urban construction land, ignoring other aspects of urbanization including the urban and rural infrastructure, public services and the protection of livelihood security, and other social contents. Under the guidance of such one-sided understanding, China's traditional urbanization suffers high incidence of urban diseases and high-risk, low-quality level of urbanization.

2. People-oriented urbanization that aims for harmonious human–land relationship. The New Urbanization that was promoted under the new historical conditions focuses on people-oriented, harmonious urbanization process. The goal of New Urbanization is to seek appropriate understanding of the mutual promotion and constraints between land urbanization and social urbanization, between human and land, and also curbs the simple "selling land to make money" mode of urbanization. New Urbanization stresses orderly and scientifically guided land urbanization, and in the meantime put the vital interests of the farmers in a prominent position. New Urbanization aims to bring the benefits from reform and opening up policies to both the rural and urban households, to ensure that every citizen can equally enjoy the benefits of education, health care, employment, social security, and housing, which was traditionally a privilege for only urban dwellers. In November 12, 2013, Article 11 of the "CPC Central Committee's Decision on Major Issues of Deepening Reform," which was approved by the CCP Central Committee's Eighteenth Congress Third Plenary Meeting, proposed to establish a unified construction land-use market. Within the market and under the premise of planning and using controls, rural collective construction land is allowed to be transferred, leased, and shared with the same right and price as state-owned land. The establishment of such market will narrow the scope of land acquisition, regulate land acquisition program specifications, and provide rational, standardized, multiple protection mechanism for farmers whose lands were acquired. In addition, the decisions also indicated that use of state-owned land for nonpublic usages will be reduced, while compensation will be required for such uses. New Urbanization will require the establishment of land-selling income distribution mechanism that takes into account national, collective, and individual rights, and allow a reasonable increase in personal income. To implement New Urbanization, we also need to improve the land lease, transfer, and mortgage secondary market. The decisions were to let the farmers get more property rights, and ultimately achieve rural–urban equality, equal opportunity, and equal treatment during urbanization process.

China's New Urbanization process is no doubt an extremely complex socioeconomic process. It also is extremely limited by ecological and environmental conditions. During the process of urbanization, we must highlight the "people-oriented" urbanization and "lands as the roots" principles. The primary challenge faced by such New Urbanization is to coordinate the relationship between urban and rural human–land relationship.

#### 2.2.2.5 From "Official-First," Government-Led to "Citizen-First," Market-Guided Urbanization

1. "Official-first," government-led urbanization. "Official-first," government-led urbanization is currently China's most popular mode of urbanization. Much of this urbanization process reflects the will of the "officials" instead of the market

or the farmers/citizens themselves. The government is the absolute strong party. In the process of urbanization, governments often act without seeking advice from the people, "call the shots" everywhere, stretch the "visible hand" far too long, and overdo the unreasonable acts. Decisions made under such a mindset often disregard the wishes of farmers and/or citizens, and totally ignore the principles and basic laws of market mechanisms. Such urbanization generally ignores the public participation in a democratic decision-making and social justice environment, resulting in artificially high-level and poor-quality urbanization. Apparently, New Urbanization attempts to shift from such traditional path.

2. "Citizen-first," market-guided urbanization. "citizen-first," market-oriented urbanization is the process of urbanization under the new strategic context of urbanization. The urbanization process fully reflects the role of market mechanisms, public participation, and democratic decision-making. The path and way of urbanization are not determined by the officials, instead by the market or the farmers/citizens themselves. Governments under such urbanization mainly serve as the regulatory organization to provide guidance to ensure that the speed, size, volume, and rhythm of urbanization are scientifically designed and rationally implemented. The role of governments shifts from decision-makers to market failure preventers in case failed market leads to excessive urbanization. In this process of urbanization, farmers/citizens will become a new force for urbanization. Private capital will follow the rules of market economy, and become an important financial source to promote urbanization and regulate the speed of urbanization. The "people-first," market-oriented urbanization will attempt to ensure the level and quality of urbanization increase synchronously. This is the New Urbanization that shall be vigorously advocated.

### *2.2.3 Strategic Developmental Directions for the New Urbanization*

The Central Work Conference of Urbanization on December 12, 2013 is the first time urbanization was discussed at the highest governmental level, which often was hailed as been a strategic milestone for promoting New Urbanization at the central government level. The conference itself fully reflects China's national determination to promote New Urbanization, and regard it as the only way to build a moderately prosperous society and to achieve sustainable modernization in China. It is also an important way to solve issues concerning development of the agriculture, rural areas, and farmers. New Urbanization shall provide strong support for balanced regional development, expanded domestic demand, upgraded industrial structure, and serve as an important starting point to achieve the great rejuvenation

of the China Dream. Based on the discussions and proposals presented in the central work conference of urbanization, it can be summarized that the national strategic plan of New Urbanization is embodied in the so-called "123456" strategies, namely, there are one (1) subject, two (2) cores, three (3) process, and four (4) red lines. At the national level, urbanization aims at building five (5) axes and achieving six (6) goals.

#### 2.2.3.1 One Subject: Urban Agglomeration

From the national "eleventh" and "twelfth Five-Year" Plan, for ten consecutive years the CPC Central Committee proposed that urban agglomeration is the primary space form for New Urbanization. The plans also proposed to continue to optimize and build the three national urban agglomerations, namely, the Beijing–Tianjin–Hebei, the Yangtze River Delta, and Pearl River Delta urban agglomerations to compete internationally. In addition, secondary urban agglomerations in the Midwest and Northeast regions where conditions permit shall be promoted via market forces and national planning guidance. Through step-by-step development, these urban agglomerations will become focal points and growth poles in the Midwest and Northeast regions. It is safe to say that China's urban agglomerations are the most dynamic and promising development cores of China's economy whether in the past or in the future, and the key development and optimization zones in China's main function regional division. Urban agglomeration is the future of China's urban development, and plays a strategic role in the national distribution pattern in productivity. Urban agglomerations have become the brand-new geographic units for the country to participate in global competition and the new international division of labor. Their development will have profound impact on the development of China's international competitiveness, and is affecting the pattern of the twenty-first century global economy. In promoting the New Urbanization, the planners, decision-makers, and urban development practitioners must follow scientific and rational principles to build a hierarchical national urban agglomeration, regional urban agglomeration, and local urban agglomeration.

#### 2.2.3.2 Two Cores: People-Oriented and Quality-First

Promoting the two cores is of strategic importance for the New Urbanization. First core highlights the people-oriented urbanization and regards promoting the people-oriented, people-centered urbanization as a primary core mission. Continuously improving the quality of the urban population, the quality of life, promoting stable employment, and orderly shifting farmers to citizens are the primary tasks of New Urbanization. Second, quality-first urbanization is highlighted on improving urbanization quality instead of playing a number's game. In particular, improving urbanization quality includes the following aspects, i.e., focusing

on improving the quality of urban development, steadily improving urbanization level based on households, greatly improving the efficiency of urban land-use and population density in urban built-up areas, effectively improving energy efficiency, reducing energy consumption and carbon dioxide emissions intensity, and effectively improving the level of urbanization and management level. These are the concrete manifestation of improving urbanization quality.

#### 2.2.3.3 Three Processes: Urbanization Is a Combination of Natural, Historical and Long-Term Processes

The New Urbanization for the first time affirmed that the urbanization process is primarily a natural process that shall not be altered or manipulated too much by human beings. It is also an inevitably encountered process for China's socioeconomic development. Furthermore, the New Urbanization must proceed abiding by the basic national conditions that China is still at its primary stage of socialism, which requires the urbanization to follow the law and make the best. In so doing, urbanization will be a smooth, natural, and sustainable process. Second, the New Urbanization also confirms that the national urbanization process is a historical process, and hence needs to comply with the laws of history and laws of urbanization development stages. Urbanization cannot go beyond the history of urban development, but must respect the history, culture, and heritage of the region to build beautiful cities with historical memory, geographical characteristics, and ethnic characteristic. Third, the New Urbanization affirms that urbanization is a long-term process. Urbanization must be scientific, orderly, active and steady, instead of being hurried, rushed. Urbanization shall avoid violating the objective laws of urban development with undue haste. Urbanization shall develop at an appropriate speed that is determined by local conditions to ensure that the New Urbanization synchronizes with industrialization, agriculture modernization, and development of information.

#### 2.2.3.4 Four Red Lines: Arable Land, Ecosystem, City Boundary, and Financial Security Lifeline

Implementing the New Urbanization in China must stick to the strict red lines in arable land, ecosystem, city boundary, and financial security. The first red line indicates that arable land cannot be further developed to urban land. Based on the principles of promoting intensive and efficient production space, livable modest living space, and beautiful overall ecological space, New Urbanization intends to form a rational structure of production, living, and ecological spaces. In the process, industrial land can be reduced reasonably, while living space especially residential space can be increased appropriately. In the meantime, farmland, orchard, vegetable, and other agricultural spaces must be protected to ensure national food security. The second red line refers to delineate and hold ecological spaces. We

must attach great importance to ecological security. If possible, we need to expand land uses for forests, lakes, and wetlands, and enhance the capacity of water conservation and environmental capacity. Urbanization shall also rely on the existing landscape context and other unique scenery to make the city part of the nature, so that residents could see the mountains and waters, and be nostalgia. In the process of promoting integrated urban and rural development, we should pay attention to retain the original style of villages, cut trees only when necessary, do not fill the lake, demolish only when needed, and improve the living conditions of the villages in the original form as much as possible. The third red line refers to scientifically delineate and hold the urban development boundary line. Cities shall be part of the nature so that urban residents could access the "Green mountains and waters." Urban planning should be gradually shifted from the expansion of city boundaries to boundary limited and spatial structure optimization planning. The fourth red line is to establish financial security lifeline. A fiscal transfer payment mechanism linked to the conversion of farmers to urban citizens shall be established to ensure its security. In addition, an efficient management system of local bonds needs to be established to encourage social capital to participate in the investment and operation of urban public facilities.

#### 2.2.3.5 Five Axes: The "Two-Horizontal-Three-Vertical-Axes" Spatial Structure of National Urbanization

The decision clarified the "Two-Horizontal-Three-Vertical-Axes" urbanization strategic spatial structure as proposed in the National Main Function Area Planning as the spatial framework for promoting China's New Urbanization. The "Two-Horizontal-Three-Vertical-Axes" refers to the Eurasian Continental Bride and Yangtze River as the two horizontal axes, and the Coastal China, Harbin–Beijing–Guangzhou railway, and Baotou–Kunming railway as the three vertical axes. The spatial pattern centers on the nation's prioritized and focal urbanized regions, linking the other cities along the axes to form an important urbanization strategic structure. The New Urbanization will stick to this spatial structure. Urban development will be based on the resources and environment carrying capacity to build scientific and rational macro-urbanization layout. The urban agglomeration will serve as the main urbanization form to promote rational division of labor, and complementary functions and collaborative development among large cities and medium and small cities and towns.

#### 2.2.3.6 Six Goals

The Central Work Conference for Urbanization proposed six distinctive goals for China's New Urbanization in the new era. These goals are the primary tasks for promoting sustainable and healthy urbanization in China. These include urbanizing agricultural population, improving the efficiency of urban construction land-use,

establishing multiple sustainable financial security mechanism, optimizing the spatial layout and form of urbanization, increasing the level of urban construction, and strengthening urbanization management. These tasks are also the specific objectives to advance national urbanization.

## 2.3 Strategic Path for China's New Urbanization Development

In Article 23 of the "CPC Central Committee Decision on a number of Major Issues Concerning Deepening Reform," which was passed in the Third Plenary Session of the Party's Eighteenth Conference, it was made clear that we need to improve the institutional mechanisms for healthy development of urbanization. To do so, we must adhere to the New Urbanization path with Chinese characteristics, which focuses on promoting human-centered urbanization, coordinated development of medium and small cities and towns, integrated development of industrialization and urbanization, and coordinated urbanization and new rural construction. The overall goals are to optimize the urban spatial structure and management structure, and enhance the cities' comprehensive carrying capacity. In addition, the process aims to transfer rural population to urban dwellers based on local conditions, and gradually urbanize the ones that meet the requirements into urban residents. This new strategy pointed into the right direction in China by shifting the sub-healthy to healthy urbanization development. According to the basic principles of this new thinking and strategic transformation of urbanization development, China's new focuses on the strategic transformation of urbanization can be summarized as being "efficient, low-carbon, ecology-friendly, environmental protection, conservative, innovative, intelligent, and peaceful." Through promoting smart growth, low-carbon, ecological civilization, environment-friendliness, resource conservation, innovation, intelligence, and safety, we intend to develop China's cities to be with Chinese characteristics and international influence and capacity for sustainable development, totally shift the traditional urbanization from the sub-healthy to healthy development (Fig. 2.1).

### *2.3.1 High Efficiency Path: Economic Sustainability for Smart City*

The high efficient path of urbanization requires urban economic development to change from the traditional mode of extensive economic growth in favor of the pursuit of intensive and sustainable economic development. Urbanization shall focus on smart growth to create conditions for building international cities, metropolis as well as world cities as the world's growth centers.

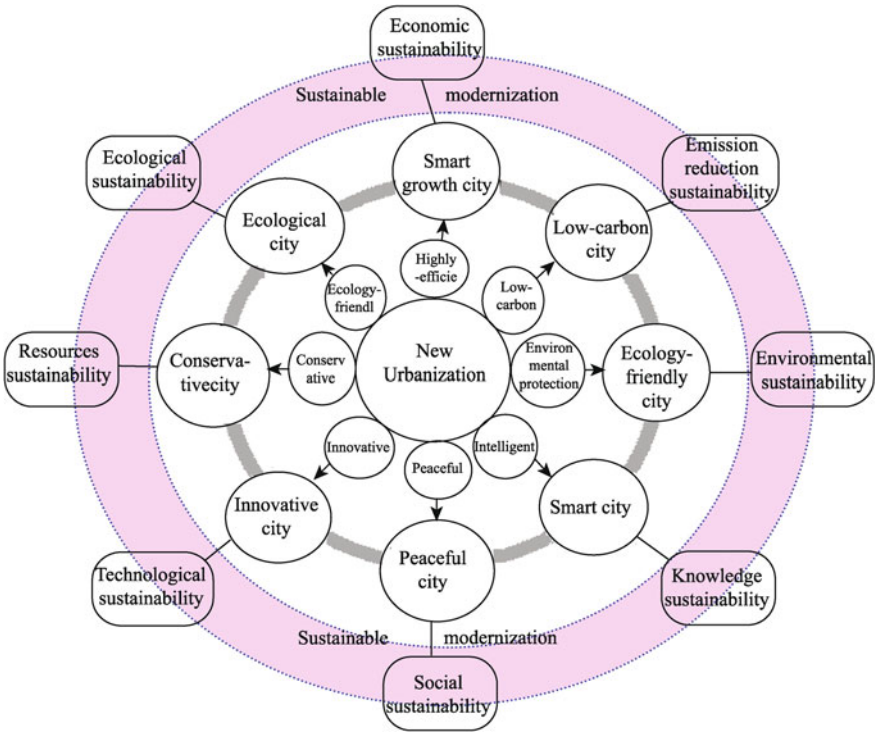


**Fig. 2.1** Strategic path for China's New Urbanization development and sustainable modernization

#### 2.3.1.1 Optimizing Urban Economic Structure and Promoting Urban Function Upgrading

Urban transformation process is the process of significant change and adjustment of urban development modes and functions. The transformation aims at enhancing and improving the quality of urban functions, and is the spiraling process of urban evolution from low to high levels, and an important means to extend the life of the cities and to achieve sustainable urban development. It is also the only way forward for the cities to evolve to higher stages. The process of upgrading the city includes transformation of urban orientation, functions, internal structure, space, management, image, and infrastructure (Fig. 2.2). Among them, upgrading the urban orientation is also called change the "sex" of the cities. The process is to re-select the nature of urban development. Urban orientation is a dynamic process with certain hierarchy. It cannot be too high or too low. The orientation of a city with certain period of urban development must be accurate. After this certain period, the cities need to go through a reorientation process or urban orientation upgrading. Upgrading urban functions is also known as the city changed its "career," which includes upgrading both the fundamental and nonessential functions. Upgrading the

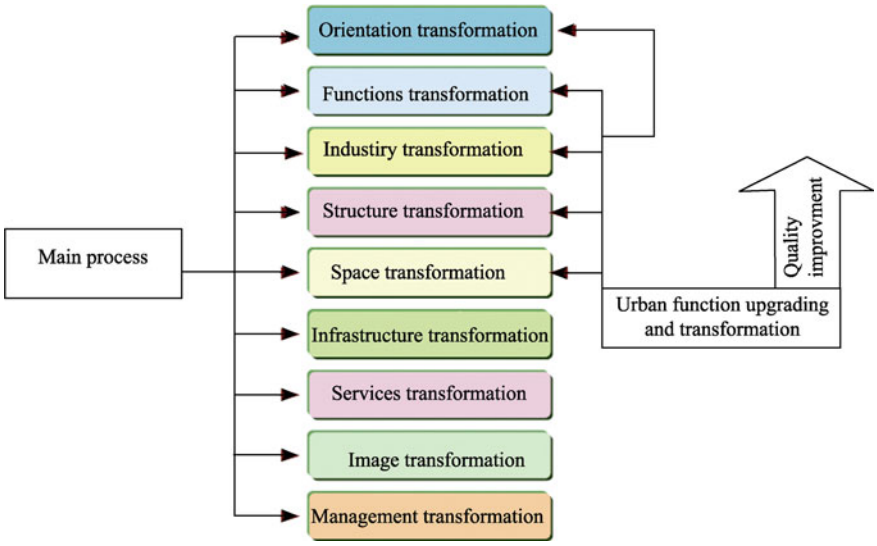


**Fig. 2.2** Diagram of urban function upgrading and transformation

fundamental urban functions is to upgrade the cities as centers to provide external services for the economy, transportation, factors of production distribution, culture, and technology. Upgrading other nonessential functions of the city refers to meeting the needs of citizens' residential, commercial, educational, and public services demands. The trend for urban function upgrading is turning from a single function to integrated functions, from regionalization to internationalization. Upgrading urban industrial structure is also known as the city changed its "stuffing," which is the key to upgrading the entire city, including the industrial upgrading, product upgrading, industrial chain upgrading, and value chain upgrading. Industrial upgrading is defined by upgrading from the resource-based traditional manufacturing industries to advanced manufacturing and modern service industry, from resource-intensive industries to capital-intensive, technology-intensive, and intelligence-intensive industries. Product upgrading is defined as upgrading from resource-based, primary processing products to moderate and deep processing products, from resource-intensive and capital-intensive goods to technology-intensive and intelligence-intensive products. Industrial chain upgrading refers to extend the industrial chain from upstream to midstream, and then downstream, from no chain to a group of industrial chains. Upgrading the value chain is defined by upgrading from the low value to high value-added chains. Upgrading urban structure is known as the city changed its "frame," referring to the process in which cities rationalize, harmonize, advance, and globalize their industrial structures. In addition, it also includes upgrading of product structure (from low-end product to the medium-end product, and then high-end products),

spatial structure (points to lines to areal to network), and resources structure (natural resources to human resources to innovative resources).

#### 2.3.1.2 Promoting Urban Industrial Cluster Coupling Mode from no-Chain no-Groups to Have-Chain Have-Group

The urban industrial chain consists of business suppliers, manufacturers, vendors, etc. based on the composition of the industrial context. According to the source of the main driving forces, it can be divided into the resource-driven industry chain, market-oriented, and technology-oriented industrial chain. In the globalization era, urban competition has evolved from competing among businesses and business groups to competition between the urban industrial chains. Among them, the urban combination mode with have-group and have-chain is the most competitive type. In China's current urban development, the urban industrial cluster coupling mode is dominated by either no-chain no-group, or have-group no-chain, or have-chain no-group, with relatively weak competitiveness. Apparently, such status quo needs to be changed (upgraded) from no-group no-chain to have-group have-chain, from a single cycle to multi-cycle economic structure [2]. This is the only way to enhance the international competitiveness of Chinese cities.

#### 2.3.1.3 Promoting Urban Development Functions from Localization to Globalization

It is imperative to foster conditions for the development of international cities, international metropolis, and world cities in China and evolve them to be global growth centers. Following economic globalization, the replacement and upgrading of urban functions is closely related with global industrial, global supply, and global value chains. Cities become indispensable strategic nodes on these value chains. With these cities serving as global growth centers, we are able to generate a development environment in which supply of resources is on a global scale; industrial chain extends within the context of globalization; the flow and sharing of talent are also on a global scale. In so doing, the urban development functions change from the previous endogenous and local to internationalization. In the process of shifting from localization to the internationalization, we will build a modern international city industrial system, and continue to extend the industrial chain for a certain period of time, foster industrial clusters, and form an international industry cluster area. Cities in China will gradually grow into international industry clusters and global manufacturing base with modern services and international significance, and eventually become international metropolis or even world cities.

### 2.3.2 *Low-Carbon Path: Pollution Reduction Sustainability for Low-Carbon City*

The low-carbon path of urbanization requires low-carbon economy and low-carbon industry. To fulfill the requirement, we need to adjust the high-carbon industrial structure, implement low-carbon consumption, and promote sustainable development and emission reduction for low-carbon society and low-carbon cities. Low-carbon city refers to the city maintains energy consumption and carbon dioxide emissions at a low level in the context of rapid economic development. Low-carbon urban development means to minimize or stop the dependence on carbon-based fuels to achieve energy consumption and economic development transition, and in the meantime maintain the stability and sustainability of urban development. Development of low-carbon economy and building a low-carbon city are the inevitable choices of China's response to global climate change, and growth pattern change. It is an important part of a resource-saving and environment-friendly society emphasizing ecological civilization, and also the inherent requirements of sustainable development for China. The cities as the key human settlements are not only the main locations for greenhouse gas emissions, energy consumption, and carbon dioxide concentration, but also the prime territory for experimenting "low carbon economy" and "low carbon society" theories to achieve low-carbon development.

Urban development in China currently still follows the path of "high resource consumption, high energy consumption, high carbon emissions, and low development efficiency." The current urban development modes in China are a typical "high energy consumption and high pollution production" mode, and "pollution first and treatment later, low-end first and high-end later, extensive development first and intensive development later" pattern. In order to fundamentally change such unsustainable urban development, future development should be gradually transformed into a "low resource consumption, low energy consumption, low carbon emission, and high development efficiency" (sometimes referred to as the "three low and one high" model of economic development). Urban development will gradually become less dependent on high-carbon industries. The goals are to maximize economic, environmental, and social benefits with minimal resource consumption, minimum energy consumption, and minimum carbon emissions. New Urbanization hence will promote the low-carbon city through the following approaches.

#### 2.3.2.1 Promoting Urban Low-Carbon Energy

Urban and economic development depends on energy consumption. If there is no low-carbon energy sources and consumption, there will be no economic development of low-carbon city. Therefore, promoting low-carbon energy production is the

only way to realize low-carbon urban economic development. For most of Chinese cities' current development modes, the coal-based energy structure is difficult to change for a relatively long time. To achieve low-carbon energy consumption and low-carbon urban development, on one hand, we need to advance the technology to economically extract hydrogen from coal, and develop efficient hydrogen storage and transportation technologies. Coal can then be used in a clean and efficient low-carbon way. On the other hand, urban development in China shall make full use of hydropower, wind power, solar energy, tidal energy, nuclear energy, and other relatively clean and renewable energy sources. Urban development shall gradually increase the proportion of new energy in the energy mix, and actively promote clean coal conversion technologies. In the short term, increasing the proportion of oil and gas consumption while promoting the use of new energy sources and the development of new energy industries shall be regarded as the prime task for a clean, low-carbon urban development.

#### 2.3.2.2 Promoting Low-Carbon Urban Economic Development

To promote low-carbon urban economic development, it is imperative to focus on encouraging upgrading urban industrial and establish low-carbon industrial structure. The traditional high energy consumption industries need to be reformed and transformed to new and high-technology-oriented industries. To do so, we need to accelerate the strategic adjustment of industrial structure, develop strategic emerging industries and modern services that are in line with the requirements of low-carbon, and promote the development of tertiary industry. This is the trend for most of China's urban industrial upgrading and an important way to reduce carbon emissions.

#### 2.3.2.3 Promoting Urban Social Low-Carbon

Foreign experience shows that guiding low-carbon lifestyle, implementing low-carbon construction, promoting low-carbon transport, and encouraging use of "low-carbon products" are not only important parts of low-carbon urban construction, but also the necessity to implement low-carbon development strategies. It is estimated that carbon emission of transporting the same amount of goods by rail transport is only 5–20 % that of by highway. The bicycle as a zero-emission transport mode, its movability in a limited space in the city is 20 times of that of cars'. Therefore, public transportation shall be the leading mode of transport in cities with specific bus lanes. In China the traditional bike paths and walking trails shall be retained and further expanded, with being "fast, punctual, inexpensive and excellent" as the goal to optimize bus trip to reduce traffic emissions.

#### 2.3.2.4 Promoting Environmental Low-Carbon

Environmental low-carbon refers to absorb and fixate greenhouse gases by certain engineer after they are discharged from the cities. If carbon dioxide emissions can be absorbed and all or most fixated, it is equivalent to reducing carbon dioxide emissions. This requires that the city continues to expand carbon sinks, improve urban space coverage, and develop and promote carbon capture and sequestration technologies. This can be done through active industrial, energy, carbon tax and carbon trading, monetary, and other policies to promote the construction of low-carbon society and low-carbon cities.

### *2.3.3 Ecologic Urbanization Path: Ecological Sustainability for Ecological Civil City*

The ecologic urbanization path requires promoting ecologic sustainable development, developing ecologic economy, promoting ecological national economy and socioeconomic activities, building ecological industrial system, and national ecological civil cities.

#### 2.3.3.1 Strategic Goals for Ecological Urbanization

The world has evolved from agricultural civilization to industrial civilization, and today to a new era of ecological civilization. Under such circumstance, ecological civil cities will serve as the role model and play a leading role for the construction of ecological civilization in China. Through the analysis of the various foundations for building ecological civil cities in China, we shall be able to synchronize agricultural modernization, new industrialization, New Urbanization, and information technology. In particular, these foundations for ecological civilization include natural environment and ecological capital base, ecological resources endowment and biodiversity, the development basis for ecologic economy and recycling economy, the foundation of Chinese cultural and social civilization, the ecological environment quality, ecologic cities, towns and communities, ecological ethics, ecological justice, and ecological education. Through the ecologic civil cities' leading roles, the goal is to achieve harmony among people, between human–land, of citizens' residential areas, of environment and ecology, and of socioeconomic systems. We intend to promote and develop cities in China to be world-class cities of ecological civilization, global ecological civilization exemplar area, international technology demonstration zone for ecological civilization, and civilization heritage of Chinese urban ecology. These cities will be green, ecological, low-carbon, environmentally friendly, intelligent, and innovative.

#### 2.3.3.2 Strategic Approaches for Ecological Urbanization

In order to build ecological civil cities, we need to adjust and optimize ecological economic structure, create green innovation, recycling and efficient industrial system of ecological civilization. These strategies include building eco-agricultural, eco-industrial, and eco-services civilization systems, developing green ecological products, and optimizing the ecology–production– living spaces. The ultimate goal is to form a scientific and reasonable spatial urban ecological civil pattern. Specifically, the strategic approaches include ten primary tasks. The first is to build strategic emerging eco-industrial Demonstration Park. This includes nurturing and developing eco-food industry, bio-pharmaceutical industry and the medical device industry, new eco-materials industry, the digital ecosystem and cloud computing industry, eco-energy industry, and other strategic emerging eco-industrial industry. The second is to build ecological civilized living demonstration zones and ecological civilized demonstration cities, towns, and villages. This includes actively developing ecology tourism and cultural and creative industries, ecological education and training industry, ecological health care industry, eco art industry, digital animation industry, the ecological financial industry, ecological civilization exhibition industry, ecological health industry, rural home SOHO industry, ecological and cultural real estate, ecology information services, and ecology services industry such as ecological civilization Expo industry. The third is to build the infrastructure support system for ecological civilization. This includes accelerating construction of low-carbon eco transport systems, smart electricity and green lighting systems, intelligent information network system, new energy supply security systems, environmental protection systems, ecological restoration systems, etc. The fourth is to build public service security system for ecological civil cities. This includes accelerating the construction of ecological civilization urban ecological education and training system, social security system, ecological civilization heritage systems, ecological civilization security systems, and ecological barrier system. The fifth is to accelerate the construction of key ecological civil cities. This includes strengthening the implementation of the ecological product engineering, cell engineering, eco-park project, ecological enterprise engineering, and ecological civilization heritage projects. The sixth is to build innovative operating mode for investment and financing system of urban ecological civilization construction. The seventh is to strengthen technological innovation to ensure technical support system for international urban ecological civilization. The eighth is to create innovative operational mechanism, improve pluralistic, coordinated, democratic and efficient management system of ecological civilization, strengthen administration mechanisms and the organization and leadership of ecological civilization construction, implement target responsibility and corporate responsibility for ecological civilization construction, improve the ecological civilization construction information management platform, and generate the roadmap for ecological civilization building strategies. The ninth is to strengthen the awareness of ecological civilization, promote ecological civilization map, and expand channels for public participation.

The tenth is to implement innovative system design and policy support system of urban ecological civilization construction.

### 2.3.4 *Environmental Protection Path: Environmental Sustainability for Environment-Friendly City*

The environmental protection path for urbanization requires actively protecting the environment, maximally minimizing environmental pollution, and constructing environment-friendly cities and national environmental protection model city.

Environment-friendly city is the result of an urbanization mode that is guided by the principles of sustainable development. Environmental-friendly cities will rationally allocate it resources, equally meet, and respect the developmental and environmental needs of future generations. In such cities, they will not focus on just promoting prosperity of the city in the short term with "predatory" approaches because of the immediate benefits. The development of such cities will not undermine regional ecological environment, and will ensure urban health, coordination, and sustainable development. Environment-friendly city is a model of urban development that is within the regional ecological, water, and resource carrying capacity. Environment-friendly urbanization includes clean urbanization, reduced emission urbanization reduction and recycling urbanization, etc.

It is realized that cities are where serious environmental pollution concentrates, and hence the foci for environmental treatment and remediation. Healthy urbanization must be environmentally sustainable development. A sustainable city is one that the social, economic, and material development achievements can be maintained in the long run. Its development has a lasting supply of natural resources, and is able to maintain lasting security, to avoid potential environmental hazards that threaten development results. Since cities are where the serious environmental pollution is concentrated, environmental pollution control should begin in the cities. Therefore, the healthy development of urbanization must be based on the carrying capacity of resources and the environment, and be environmentally friendly. To promote such New Urbanization principles, first, we must change the high energy, noncyclic operation mechanism of today's cities, and improve the efficiency of all resources and human capitals so that materials are best used and talents are best allocated. Specifically, materials and energy shall be used at multi-levels, and waste will be recycled and new materials regenerated, so that urbanization will become material and energy recycling and efficient process. Second, the city's economic operation shall achieve the goal of high-yield, low-emission (individual industries and enterprises can achieve "zero emissions"). To do so, at the macro level, a reasonable industrial structure that focuses on the development of resources and energy-saving production methods, the formation of the efficient operation of the production, and control systems is a must. At the micro level, we need to actively develop production techniques that are conducive to healthy environment, to design

more durable and repairable products, and to minimize waste and expand recycling and reusing of materials to build clean and reduced emission-reduced cities.

### 2.3.5 *Resource-Saving Path: Resource Sustainability for Resource-Saving City*

The resources saving path for urbanization require promoting sustainable resources usage. In particular, the task is to build water-saving, energy-efficient, land, and materials-saving cities.

From the point of view of resources supply security, land is the main carrier; water is the lifeblood, and energy is a primary "power" of the New Urbanization. Land, water, energy, and other resources are important safeguards for urban and regional sustainable development. Lessons learned from other nations' experiences indicate that in the rapid development period of industrialization and urbanization, arable lands were losing the fastest. This is understandable since industrialization and urbanization require large amount of lands that were often easily available from converting the arable lands. With the further development of urbanization and industrialization, and increased consumption after income growth, the demand for land resources and energy resources will increase rapidly even further. Urban development will inevitably face greater pressure on resources and the environment. For this reason, sustainable urban development must take the path of intensive use of resources, centralized urban layout, and compact development. The patterns of the New Urbanization shall focus on prioritizing conservation pattern and environmental protection. We must implement water-saving, land-saving urbanization, material-saving, and energy-efficient and saving urbanization. In particular:

Water-saving urbanization is urbanization considering regional water carrying capacity. It mainly focuses on limiting the development scale, implementing and popularizing water-saving technology, building a water-saving system of industrial structure, and determining the development scales for large, medium, and small cities. The goals are to build an urban system whose water demand and foreseeable increases are within the regional water carrying capacity. This is to ensure that urban development is coordinated with population, resources, and environment carrying capacity. City sizes and socioeconomic development level are determined according to available water under the current technology. The general principle is that ecological water demand is the highest priority, and then city sizes, land-use scale, population size, production capability, and urbanization speed will all be determined by available water.

Land-saving urbanization indicates an intensive land-use mode for urbanization. Land-use for urban development shall follow the principles of promoting industrial clusters, centralized distribution, and intensive land development. Instead of the past extensive land-use, urban sprawl mode of development, the New Urbanization

intends to tap the full potential of existing urban land, determine reasonable amount of land for urban development, and increase output efficiency per unit of land.

Material-saving urbanization refers to save and use a variety of materials, employ available technology to reduce the consumption of energy and raw resources in the process of urbanization. The goals are to ensure sustainable and efficient use of various raw materials to build material-saying cities and society.

Energy-saving urbanization refers to efficient use of energy during urbanization. Maximizing energy savings shall be promoted and enforced in all energy consuming city activities, including the urban architectural environment, lighting and security control, high-speed data networks and local emergency backup generators, etc. The goals are doing everything possible to reduce all aspects of energy consumption, to reduce energy consumption per unit of output, and build energy-saving and energy-efficient urban society.

### 2.3.6 *Creative Path: Science and Technology Sustainability for Creative City*

Implementing innovation-driven development strategy, promoting the sustainable development of technology, enhancing the capability of independent innovation and collaborative innovation, and building an innovative city and the state of global innovation-oriented city are the main driving forces to promote the New Urbanization, as well as the soul of healthy development of China's urbanization.

Innovative city refers to cities that are based on scientific and technological progress as the driving forces, self-innovation as the primary guidance, and innovative culture as the basis. The primary driving elements of urbanization are science and technology, knowledge, human capital, culture, institutional innovation, and the like. Innovative city is an important source for carrying out national innovation activities, and key for strengthening and building an innovation-oriented country and national innovation system. It is the core engine to accelerate the transformation of economic development modes, and strategic locations to accelerate the New Urbanization and rural construction. Building innovative city is imperative to explore the new models of urban development and promote sustainable urban development, which has important strategic position in China's economic and social development. For this reason, the following guiding documents by the Chinese Central Government, "China's Long-term Technology Development Plan (2006–2020)" (National Development Committee [2005] No. 044), "National Economic and Social Development Twelfth Five-Year Plan" "National Twelfth Five-Year Plan" for "Science and Technology Development Plan" (National Science and Development Plan [2011] No. 270), "National Development and Reform Commission on the Promotion of National Innovation-oriented City Pilot Work Notice" (Development and Reform Committee High-tech [2010] No. 30), and the National Science and Technology Ministry all have proposed building an innovative city. Moreover, even

the "Constitution of CCP" as amended in 2012 also proposed building an innovative nation, and implementing innovation-driven development strategies. At present, China has entered a crucial stage to build an innovative nation by 2020. Building innovative cities, hence, has very important practical significance to enhance our capacity for independent innovation and international competitiveness, and accelerate the process of building an innovative nation [3].

#### 2.3.6.1 Innovative Cities: Patterns and Modes

To successfully carry out China's New Urbanization strategies, we must implement the industrial innovation led mode (including high-tech industries led and advanced manufacturing led modes), the cultural innovation led mode (including the modern culture innovation led and traditional cultural heritage guide modes, etc.), service innovation led mode (including cultural and creative industries led mode the modern service led mode, etc.), technological innovation led mode (including knowledge innovation and technological innovation led modes, etc.), institutional innovation led mode (including the market operation mechanism innovation led and the Government Management System Innovation led modes, etc.), and multi-drive linkage innovation. The implementation will use high-tech parks as carriers to modify from simple manufacturing to active creating in order to build the industry innovation city. The central business district will serve as the carrier to change businesses to be services to build service industry innovation city. The agricultural science and technology parks will serve as the carrier to modify the farm field to manor field to build modern agricultural innovation bases. The Research and Development institutions will serve as the foundation for building a scientific innovation city. The information technology will serve as a means to change the regular manufacturing to smart manufacture, to build an intelligent innovative city. Societal harmony will be the primary purpose of this collaborative innovation city. Livable environment is the goal, and developing ecological economy and low-carbon economy is the ways to build a green innovation city. Open collaboration will be the primary approach to build an internationally innovative city. The ultimate goal is to gradually build a five-level hierarchical national innovative urban space network [4], namely, the world's innovative cities, national innovation-oriented city, regional innovative city, innovative city areas, and innovative developing cities.

#### 2.3.6.2 Transition from "Made in the Cities" to "Created in the Cities"

With the drive of urban development from factor-driven to innovation-driven, and from "Made in the Cities" to "Created in the Cities," the nature and orientation of urban development, urban development strategy, urban industrial structure, urban form, urban industrial system, and urban system also are going through profound

transformation. For instance, a comprehensive restructuring of Jiaozuo City is a successful example. Jiaozuo City used to be a mining city. Yet, by carefully implementing the strategic transformation, it changed gradually from a pure coal-centered local economy to a regional economic center. Or some would prefer that it changed from black to green. Its resource development strategy changed from focusing within the ground to on the ground. Its economy changed from the development of the mine toward the development of tourism, finishing the fundamental urban industrial restructuring. The successful implementation of the transformation of urban functions (Zhongyuan urban agglomeration modern industrial city, and an international tourist city), the city image rebuilding and reorientation certainly provide a very good example for similar cities that are in dire need of this transition. Specifically, by restructuring its economic and industrial structures, Jiaozuo's industrial structure changed fundamentally. The traditionally dominant energy, chemicals, and metallurgy industries declined in the city's GDP, of which coal dropped from 5 % in 1995 down to 2.6 % in 2008, and the electric power industry dropped from 5.7 % in 2000 down to 4.3 % in 2008. On the contrary, resource-intensive processing industries such as aluminum industry rose from 1995s 0.56 to 8.3 % in 2008. Agricultural processing industries as represented by Mengniu, Huaiyao rose from 1.5 % in 1995 to 7.2 % in 2008. New material industries as represented by automotive parts rose from 1.32 % in 1995 to 9.3 % in 2008. The proportion of the tertiary industry (mainly tourism) is now more than 30 % in the city's GDP.

### *2.3.7 Intelligent Path: Knowledge Sustainability for Intelligent City*

Smart (or Intelligent) city is an advanced form of urban information that makes full use of the new generation of IT industries in the city among the next generation of innovation and knowledge-based society (sometimes refer to "innovation 2.0"). Smart city is also an innovative and sustainable urban form, which is based on new generation of IT, such as the Internet of things (IOT) and cloud computing, and applications of various methods and tools such as Wikipedia, social networks, Fab Lab, Living Lab, and comprehensive integration in urbanization. Smart city creates an "ecology-system" that facilitates innovation to achieve a comprehensive and thorough perception, to maintain ubiquitous broadband connectivity, and to encourage intelligent integrated applications and user innovation, open innovation, public innovation, and more importantly, collaborative innovation. These are all primary characteristics of sustainable innovation city mode. With the rise of the "Internet empire," the convergence of mobile technology, and the innovative process of democratization, the smart city that emerged from the wisdom legacy of the knowledge society is an advanced form of city informatization development after digital city. Being smart means the city develops based on technology

(technological smartness) and people (intelligence), with technology as the facilitator, people lead the development.

#### 2.3.7.1 Smart City Is the Advanced Form of Informatizated Urban Development that Is Knowledge-Driven

Smart cities increase their wealth via knowledge flows, highlighting the development of knowledge-intensive industries and promoting the sustainable development of knowledge cities. Drivers of urban development shift from innovation-driven to a higher level of knowledge and intelligence-driven. Smart city uses information and communication technology (ICT) to make city life more intelligent, use of resources more efficient. Developing smart cities will result in cost and energy savings, improve service delivery and quality of life, reduce impact on the environment, and support innovation and low-carbon economy. Smart city focuses on development of highly integrated smart technology, high-end smart industry, promotion of convenient and efficient intelligence services, and people-oriented continuous innovation. Smart city is really a solid representation of smart Earth, and also the ultimate form of the city informatization development. Smart city will change our living environments, relationship among things, and people and things. It will also profoundly affect and changed the way people work, live, play, social behavior, and all other operating modes.

In IBM's white paper, "Smart Cities in China," based on a new generation of IT-based applications, the definition of the basic characteristics of the smart city is comprehensive IOT, fully integrated, innovation encouraging, and collaborative operation. Specifically, smart sensor device will integrate urban public infrastructure into the IOT, the Internet and the IOT will be completely fused, government and business will apply science and technology innovatively innovation into their daily activities based on intelligent infrastructure, and all the key systems and participants of the city will engage in harmony and efficient collaboration. "Smart City from the Innovation 2.0 Perspective" emphasizes that smart city will not only focus on IOT, cloud computing, and other new generation of information technology, but also emphasize on people-oriented, collaborative, open, and innovative user participation. In this regard, smart city is defined as the urban form that is supported by the new generation of information technology and the next generation of innovation and knowledge society (innovation 2.0). Smart city is also based on comprehensive and thorough perception, ubiquitous and broadband Internet, application of intelligent fusion, and construction of institutional environment and ecology that are conducive to innovation. Smart city aims to create people-oriented sustainable innovation characterized by user innovation, open innovation public innovation, and collaborative innovation. Development of smart city will shape urban public value, create unique value for the life of every citizen in between, and achieve sustainable development of cities and regions. Therefore, we can summarize the four main features of the smart city as follows: a comprehensive and

thorough perception, ubiquitous broadband connectivity, intelligent integration of applications, and people-centered sustainable innovation.

#### 2.3.7.2 Developing Smart Industry Based on Information and Internet Technology, Building Smart Urban Complex

The connotation of smart sity includes smart technology, smart industry, smart services, smart management, smart humanities, and smart life. Technology innovation and application are the means and driving force for building a smart city. Smart industry is the carrier. Smart services, smart management, smart humanities, and smart life are the goals of smart city. Specifically, smart industry includes smart transportation, smart electricity grid, smart logistics, smart health care system, smart food system, smart medicine systems, smart environmental protection, smart water resource management, smart weather and climatic forecasting system, smart business, smart banking, smart government, smart home, smart communities, smart schools, smart architecture, smart buildings, smart oil field, smart agriculture, and many other aspects. Using visual collection and identification, various types of sensors, wireless location systems, radio-frequency identification (RFID), bar code recognition, visual tags, and other top technology, we are able to build intelligent vision of IOT, sense the elements of the urban complex intelligently, and automate data collection, which covers the commercial, office, residential, hotel, exhibition, restaurant, conference, entertainment and transportation, lighting, information and communications, and display of the urban complex. The collected data will be visualized and standardized, so that managers can visualize urban complex management to create a smart urban complex.

1. Building smart urban public services and management system. By strengthening employment, health care, culture, housing and other professional application system construction, increasing construction and management standardization, precision and intelligent level, effectively sharing urban public resources in the city, and actively promoting coordinated and efficient population flow, logistics, information flow, capital flow, smart city managers will be able to operate efficiently and enhance the city's public services while promoting the transformation and upgrading of urban development.
2. Construction of smart city government comprehensive management operation platform. The smart platform includes the command center, computer network room, intelligent monitoring systems, digital public library, and street network systems. Among them, the command center includes the six central systems of government intelligence, namely, public security emergency systems, public service systems social management systems, urban management systems, economic analysis systems, and public opinion analysis systems. The platform provides technical support for the scientific leadership of decision-making.
3. Construction of smart settlement services system. The smart settlement services system carries out pilot smart community research projects to fully take into

account the different needs of the public areas, business districts, and residential areas. By integrating the IOT, the Internet, mobile communications, and other information technology, and developing community-government, smart home systems, intelligent building management, smart community services, community remote monitoring, security management, smart business other intelligence office applications, the smart settlement services system will be able to enable urban residents to experience "smart development."

4. Construction of smart education and cultural services system. Through improving urban education metropolitan area network (MAN) and campus network projects, promoting intellectual development of education, focusing on building an integrated educational information network, online schools, digital courseware, teaching resource library, virtual library, integrated teaching management system, remote education system, resource sharing database, and shared application platform, we intend to build a learning society.
5. Construction of smart logistics service applications. Through embedding information technology into the integrated logistics park, promoting applications of RFID, multi-dimensional bar codes, satellite positioning, cargo tracking, e-commerce, and other IT technologies in the logistics industry, we will be able to accelerate the construction of information platform based on IOT and the fourth-party logistics. In addition, via integrating logistics resources, we will be able to achieve the integration of government services and logistics business, and promote the development of information technology, standardization, logistics companies, and smart logistics industry.
6. Construction of smart e-commerce system. Building smart city also indicates supporting enterprises through encouraging them to build their own websites or through third-party e-commerce platforms to implement e-commerce activities, such as online inquiry, online purchasing, online marketing, and online payment. In addition, the smart e-commerce system will also seek to improve service levels and actively promote the modern business services, tourism and convention industry, intermediary services, and other modern services via application of e-commerce tools and innovative services. The e-commerce system also will actively build online e-commerce platforms, encourage the development of public information service platforms that use e-commerce platforms as the aggregation points, and foster the development of e-commerce businesses. The emphasis will be on the development of comprehensive e-commerce businesses or industry e-commerce websites that integrate products, information dissemination, transaction, and payment.
7. Construction of smart health care system. The smart health care system focuses on promoting the establishment of a "digital health care" system. A smart health care system intends to establish health service network and urban community health service system, build regional health information management system as the core information platform to facilitate communication and interaction among various healthcare information systems. Hospital management will be "digitized" and electronic medical records created. The digital health care system focuses on establishing national electronic health records to build a hospital

services network. In so doing, the smart city will be able to promote remote appointment and registration, electronic billing, remote medical services, remote diagnostic systems, and other remote and digital services to enhance the health care services and health of the citizens.

8. Construction of intelligent transportation system (ITS). The ITS is an integrated system that focuses on building "digital traffic" projects through monitoring, surveillance, traffic distribution, and optimization technology. The goals of ITS are to improve public security, urban management, road, and other monitoring systems and information network systems. In so doing, we are able to build a unified intelligent urban traffic management and integrated service system that focus on traffic guidance, emergency coordination, smart travel, taxis, and buses management systems. Moreover, with ITS, we will be able to share traffic information, monitor, and manage of road traffic conditions real time for a smart traffic management.

Via the development of smart industries, we shall be able to promote the cities to the development from digital city, intelligent city, to smart city. The smart city will be comfortable, convenient, green, and harmonious location for its residents.

### *2.3.8 Safe Path: Societal Sustainability for Safe City*

The safe path for urbanization shall be clear on the mentality that "safety is the first concern" of urban development. Urban public safety shall be given the highest priority to promote sustainable development of society, build a moderately prosperous and harmonious society and a national security city. Within a safe city, there should have no dangerous elements; the public is not threatened; production and daily life shall be accident-free, and the people shall generally have a satisfactory sense of security. The ultimate goal of ensuring the safety of the city is to build the safest cities from the outset. Via promoting sustainable urban development, minimizing security risks, and ensuring the safety factors of the city to the highest degree, the safe path of urbanization intends to achieve the strategic objectives of the healthy cities.

#### 2.3.8.1 Safe Urbanization and Urban Public Safety

Urban safety refers to a state of dynamic stability and coordination in resource supply, environmental, economic, social, cultural, health and other aspects, and the resilience to natural disasters and social and economic anomalies or incidents. Urban safety has broad and narrow senses. The broad urban safety includes secure resource supply, safe environment, safe economic development, safe society, safe culture, and safe health, etc. Safety in these aspects has profound impact on the entire city's safety, and hence can be referred to as "macro safety." The narrow

sense of urban safety refers only to policing and crime prevention, and hence is also called the "micro safety." Urban safety within the meaning of urban planning usually refers to the broad urban safety. According to the "macro" sense of urban safety, it has two primary connotations. First includes approaches that prevent the sense of insecurity caused by disasters, including natural disasters and man-made disasters. The second is to improve supplies to reduce the sense of insecurity caused by various shortages, including water resources, land resources, energy resources, food, various productions, and subsistence shortage of supply due to inadequate supplies.

In general, urban safety has rather broad contents, including urban resources security, urban ecological security, urban economic security, urban social security, urban production security, and urban living security.

1. Urban resource security refers to the necessary resources supply and reserve that protect the city's normal production and normal life of residents, including water security, energy security, land security (arable land security), and mineral resource security. For instance, in the 656 cities in China, 75 % of them suffer water resources shortage. Among them, a quarter suffers serious water shortage, and hence are very unsafe cities. Moreover, due to the depletion of mineral resources, the so-called resource-exhausted cities also belong to the unsafe city category. For instance, Yumen city of Gansu Province prospered due to oil development, yet now degraded to a "ghost town" because of the depletion of oil resources.
2. Urban ecological security refers to the status of urban ecological environment staying in good condition, and free from damage and pollution (harm). In this state, the city's environment maintains a well-structured and sound ecology function, and is able to self-regulate and self-purify. Urban ecological environment is the fundamental material basis for human social and economic activities, and the support system for the formation and continued and sustainable development of cities; therefore, urban ecologic security is the most fundamental condition of urban safety.
3. Urban economic security refers to the fact that urban economy is able to maintain normal operation and development when subjected to a variety of external threats, such as natural disasters, inflation, financial crisis, and the cyclical economic fluctuations. With higher economic security, the city's economic development and the overall situation will not be disrupted easily, and be able to secure a favorable position and a favorable external environment in the competition both domestically and globally.
4. Urban social security refers to the organization, order and stability in city's daily operation, as well as the resilience and prevention while under the threats of internal or external disturbances (such as violence, war, floods, earthquakes, tsunamis, landslides, haze, landslides, terrorist attacks, etc.) so that they will not cause severe social unrest and even subvert.
5. Urban production security refers to the city's resilience toward incidents that are inevitable in a variety of production activities, and work-related injury. Urban

production security indicates that the incidents can be contained locally so as not to cause serious damage to urban production systems, and can be immediately processed even if the inevitable happens.

6. Urban life security refers to the city's capability to ensure food security and health security. In particular, through strengthening health legislation, oversight and enforcement of food production, and other daily necessities, the city is able to ensure that food, drinking water, and other diet-related products are safe and healthy. Moreover, strengthening animal quarantine, improving animal disease surveillance, prevention and control, quarantine, and supervision system are also important to ensure the safety of animal products, in order to fully ensure the safety of city life.

#### 2.3.8.2 Safe Urbanization and Key Points of Urban Security and Prevention

Since urban security issues become more prominent and safety problems become more serious, we propose to work on the following five key points (aspects) in the New Urbanization paradigm to ensure urban safety:

1. A safe city must be people-oriented, focus on safety as the first priority, and emphasize on both protection and prevention equally. Urban safety issues must have the highest priority for any ensuing planning. This requires that we highlight "prevention" and "safeguard" as the two main themes in urban planning. We will then be able to compile the "urban security system planning," so that we can handle the relationship between the costs and benefits of urban security investment more appropriately to ensure safe, healthy, and sustainable development of the city.
2. A safe city will strengthen the construction of security and emergency defense system. In urban planning, the so-called "seven defense," namely, urban flood control system, antipollution system, firefighting systems, earthquake preparation system, antiterrorism system, epidemic diseases prevention system, and air defense systems, shall be well-planned and built. The goals are to build forward-looking and strategic disaster prevention system.
3. A safe city will strengthen security support system according to the city resources and environment carrying capacity. In the preparation of the master plan of the city, it is recommended to add a specific chapter devoted scientifically analyzing resources and environment carrying capacity of the city. We will then determine the reasonable capacity of the population and the economy according to the carrying capacity of the city's resources and environmental basis. In so doing, we will be able to ensure various supplies and resources are within the safety operating range.
4. A safe city will also strengthen the citizens' safety awareness. Good urban safety publicity will enable every citizen to feel the responsibility and obligation to protect the city (their city). It is imperative to strengthen education and improve

national security awareness among the mass public. Public safety knowledge courses shall be included in the curriculum as required courses of primary and secondary schools. At the neighborhood level, we need to strengthen the development of social volunteers and social assistance services team and construct residential street grassroots emergency management network.

5. A safe city will have a set of robust urban safety evaluation indicator system, and information for that system shall be kept up-to-date. The indicator system shall include scientific decision-making command system, a complete legal system of public safety, efficient crisis early warning system, reliable information and control system, and the city public security system. The urban decision-makers can use the indicator system to pinpoint unsafe points within the city and then take relevant precautions and actions.

## 2.4 Strategic Guidelines for China's New Urbanization Development

Urban development guidelines are a set of specific codes of conduct for the nation to achieve the goal of urban development in a certain period of time [5], and also the guiding program for sustainable and healthy urban development. Urban development at different stages requires different guidelines. As a matter of fact, the principle of stage-like urban development dictates that the guideline for urban development is dynamic and changes with different stages of the city [6, 7]. China's urbanization has entered a stage of rapid development, while in the meantime at a critical transition period. Specifically, China's urbanization (measured by statistical yearbooks) has passed the level of 50 % (half of the residents now reside in cities). The urban disease issues now reach a level that improving urbanization quality is the only way for healthy and sustainable future of cities. Accelerating urbanization also faces severe resources and environmental restriction. This is the key period in which the coordinated development of urbanization, industrialization, modernization of agriculture, and information technology is of critical importance. The CCP's 18th Plenary Report and the Central Economic Work Conference have proposed to actively and steadily promote urbanization, and strive to improve the quality of urbanization, embedding the concept of ecological principle and civilization and into the entire process of urbanization, focusing on New Urbanization that is intensive, intelligent, green, low-carbon [8]. Under the new historical conditions, urbanization has become a historical task for China's modernization and the greatest potential for expansion of domestic demand. In some cases, promoting urbanization even became the country's "magic bullet" and "master key" for solving a series of problems in economic and social development. However, it is worth noting that the rapid urbanization process requires a scientific approach to guide the overall urban development. Since 1980, China has implemented the urbanization guidelines that "strictly control the development of large and megacities, and rationally promote the development of

medium-sized cities and small cities, and actively develop small towns." This is the first time that China legalized the guidelines of urbanization, and the guidelines are still in effect. After 30 years of implementation, the guidelines prove to have played an important role in guiding the acceleration of the healthy development of China's urbanization, the formation of the overall pattern of urbanization, and the promotion of China's urbanization and urban development [9]. However, these guidelines for urban development have exposed a series of issues that need to be addressed under the new circumstances. We need to propose new guidelines that are in line with the reality of the current development of urbanization and its future goals, so that we can guide the formation of a new pattern of urban development, and ensure the future of China takes a resource-saving and environment-friendly new urbanization development path.

### *2.4.1 The Evolving Course of China's Urbanization Guidelines*

From the establishment of the People's Republic of China (1949) to now, China has experienced eleven "Five-Year Plans." The "Five-Year Plans" are critical governmental guiding master plans for the entire nation's societal, economic, urban, rural development, and many other aspects. For each "Five-Year Plan," the central government establishes national-level policies to directly or indirectly influence the development of China's urbanization [10]. It is under the guidance of these national macro-control policies that China's urbanization has made remarkable achievements as of today. Yet as we know that there were always different characteristics of urbanization policies and developing paths at different times, urban development was very keen to certain conditions and political history and the economic environment, which reflects the complex nature of urban development. Specifically, for the 58 years from 1953 to 2010, China has experienced project-driven "free" urbanization in the first "Five-Year Plan," the chaotic urbanization period in the second "Five-Year Plan," the turbulent yet depression and stagnant urbanization in the third and fourth "Five-Year Plan," active urbanization during the recovery and reform period of the fifth "Five-Year Plan," urbanization that controls the large and megacities, but promotes medium and small-sized cities in the sixth "Five-Year Plan," the so-called diversified urbanization in which all size of cities were encouraged to develop in the seventh and eighth "Five-Year Plan," healthy urbanization in the ninth "Five-Year Plan," coordinated urbanization in the tenth "Five-Year Plan," harmonious urbanization with Chinese characteristics in the eleventh "Five-Year Plan," and currently promoting active, steady, and healthy urbanization (Table 2.2) during the twelfth "Five-Year Plan." The urban development policies have been adjusted several times along the way to ensure the overall development of urbanization in China moves toward diversified, coordinated, and healthy development [11].

**Table 2.2** The changes of China's overall guidelines of urbanization and their effects

| Development periods | Years | Main guidelines and policies | Effects |
|---|---|---|---|
| First "Five-Year Plan" | 1953–1957 | Project-driven, "free" urbanization, steady progress | Project-driven free urbanization |
| Second "Five-Year Plan" | 1958–1962 | Adjustment and consolidation, enrichment and promotion | Chaotic urbanization |
| Third "Five-Year Plan" | 1966–1975 | Controlling large cities, encouraging small cities | Turbulent yet stagnant urbanization |
| Fourth "Five-Year Plan" | | | |
| Fifth "Five-Year Plan" | 1976–1980 | Strictly controlling large and megacities, properly promote medium- and small-sized cities | Active urbanization |
| Sixth "Five-Year Plan" | 1981–1985 | Controlling large cities, encouraging small cities and townships | Rural urbanization |
| Seventh "Five-Year Plan" | 1986–1990 | Strictly controlling large and megacities, properly promote medium- and small-sized cities | Diversified urbanization with coordinated development |
| Eighth "Five-Year Plan" | 1991–1995 | Building development zones to drive large cities' development | Diversified urbanization with large cities dominated |
| Ninth "Five-Year Plan" | 1996–2000 | Strictly controlling the development of large cities, encouraging the development of small cities and townships | Healthy urbanization with coordinated development |
| Tenth "Five-Year Plan" | 2001–2005 | Diversified and coordinated development of large, medium, and small cities and townships | Coordinated urbanization |
| Eleventh "Five-Year Plan" | 2006–2010 | Focus on urban agglomerations, healthy and coordinated development of large, medium, and small cities and townships | Harmonious urbanization with Chinese characteristics |
| Twelfth "Five-Year Plan" | 2011–2015 | Coordinated development of urban agglomerations and large-, medium-, and small-sized cities and towns | Active, steady and healthy urbanization |

#### 2.4.1.1 The Project-Driven, Free Migration Urbanization in the First "Five-Year Plan"

From 1953 to 1957, the first "Five-Year Plan," urban development in China mainly concentrated on the key industrial cities where the 156 key projects were located. There was virtually no rural–urban migration (and vice versus) restrictions. Cities opened their doors to the countryside to quickly accumulate necessary labor forces. Then the urban development guidelines are "project-driven, steady progress, and freedom of movement." After the issuance of the first constitution of PRC in 1954, town was clearly defined as an administrative unit that was at the same level as townships or ethnic townships, and was under the jurisdiction of counties. After June 1955, the State Council promulgated the first municipal building regulations, "Decisions of the State Council on Establishment of the Town," and in December the same year promulgated the "Decision the Standards on Urban-Rural Division," which gradually put China's urbanization into the standardized track, greatly promoted the process of urbanization. By 1957, the number of cities increased from 135 in 1949 to 176 [12].

#### 2.4.1.2 The Urbanization Guidelines of "Adjustment and Consolidation, Enrichment and Promotion" in the Second "Five-Year Plan"

In the second "Five-Year Plan" from 1958 to 1962, due to the impacts of "Great Leap Forward" "anti-rightist" campaign and the 3 years of natural disasters, in 1961 the country began to implement the "adjustment, consolidation, enrichment and improvement" guidelines for urban development. During this period, the urbanization guidelines encourage urban labors to return to rural areas and participate in the labor force in agricultural production, which led to sharp drop of urban population [13]. According to statistics, from 1961 to the end of 1963, a total of 18.87 million urban workers returned to the rural areas, which reduced the urban population of approximately 30 million people. Urbanization level (as measured by the percentage of urban population) dropped to 16.8 %. In December 1963, the central government also issued a "Directives on the Adjustment of Township Establishment and Reduction of Outskirt Sizes," which called for repeal of cities that were not qualified for being a full-fledged city, reduction of the existing cities' outskirts, and raising the standards for establishing townships. The Directives indicated that places with more than three thousand people and 70 % nonagriculture population qualify for township status. Places with over 100,000 people and 80 % nonagricultural population can be established as a city. The Directives also set the provisions that city and town population (the urban population as recorded in the annual statistic yearbooks) include only nonagricultural population living in the cities and towns, which narrows the scope of the urban population statistics. According to statistics, by the end of 1964, China had withdrawn 39 cities, so that the number of cities reduced to 169. By the end of 1965, a total of 1527 established

towns were revoked, which reduced the number of towns to 2902. Consequently, the national urbanization level stayed at 18 %.

#### 2.4.1.3 The Urbanization Guidelines of "Controlling Large Cities, Encouraging Small Cities" in the Third and Fourth "Five-Year Plan"

During the third and fourth "Five-Year Plan" (1966–1975), China experienced the unprecedented "Cultural Revolution," which brought enormous turmoil to the nation's societal, economic, cultural, and demographic aspects. The general guidelines for that period were "preparation for war and famine," "Three Front Movement," and "no large cities." During the decade, 1.7 million so-called "educated youth" (Zhiqing) started the famous "Up to the Mountains and Down to the Countryside Movement," and over 10 million governmental officials were sent down to the rural areas to experience agricultural work. In this period, enormous amount of human capital and resources were withdrawn from the cities and invested to the "Three Front." There was almost no recognizable investment in any cities. Since the central government follows a strict guideline for urbanization that China shall "control the size of large cities and encourage small cities," population mobility was strictly regulated. During this decade, China's urbanization level stayed at 17 %, reflecting a unique urbanization process during the chaotic, depressive, and stagnant period in China's history.

#### 2.4.1.4 The Urbanization Guidelines of "Controlling Large Cities, Encouraging Small Cities and Townships" in the Fifth and Sixth "Five-Year Plan"

During the fifth "Five-Year Plan" (1976–1980), urban development in China experienced serious difficulties. The national economy was severely imbalanced with artificially heightened industrial outputs. The population reached its peak of fertility. There was enormous employment pressure for the returned educated youth from the "Up to the Mountains and Down to the Countryside Movement." Urban infrastructure was way underdeveloped, especially in large cities since they experienced the most population inflow. To deal with this situation, the Third National Urban Working Conference in 1978 established the guidelines for urbanization to "control the size of large cities, but encourage the development of small cities and towns." From 1978 to 1980, the number of cities grew from 190 to 223. The level of urbanization correspondingly increased from 17.92 to 19.39 %. In 1980 the State Council approved the "Outline for National Urban Planning Working Conference," which proposed but not implemented the urbanization guidelines to "control the scale of large cities, rationally develop medium-sized cities, and actively develop small cities."

In the sixth "Five-Year Plan" from 1981 to 1985, the Third Plenary Session of the CCP's Eleventh National Conference adopted the "CCP Central Committee's Decisions on Economic Reform." The focus of reform started to shift from the countryside to the cities. In October 1984, the Ministry of Civil Affairs relaxed standards for establishing townships. As a result, the number of towns increased rapidly thereafter. On October 13, 1984, the State Council issued a "Notice regarding some Issues of Farmers Registering in the Townships." In the Notice, it was mentioned that "farmers and their family members who apply to work, do business, engage in the service industries, have fixed residence in the township, have certain management ability and serve as long-term workers in the township enterprises shall be allowed to have the permanent residence in the township. These people will be recorded as nonagricultural population." The establishment of this new household registration management policies and municipal standards has greatly promoted the development of China's cities and towns, especially small towns. The number of towns increased rapidly from 2678 in 1981 to 9140 in 1985. The number of cities increased from 226 to 324 during the same period. Consequently, China's urbanization level increased from 20.61 % in 1981 to 23.71 % in 1985.

#### 2.4.1.5 The Urbanization Guidelines of "Strictly Controlling Large Cities, Encouraging Medium-Sized and Small Cities" in the Seventh "Five-Year Plan"

During the seventh "Five-Year Plan" (1986–1990), the central government explicitly proposed the urbanization guidelines that we need to "firmly prevent excessive expansion of cities and focus on the development of small cities and towns" [14]. "The People's Republic of China Urban Planning Law" that was in effect in April 1, 1990 also made it very clear that China's urbanization shall "strictly control the size of large cities, rationally develop medium-sized cities and small cities."

#### 2.4.1.6 The Urbanization Guidelines of "Development Zone-Driven Development of Large Cities" in the Eighth "Five-Year Plan"

During the implementation of the eighth "Five-Year Plan," China has entered the stage that focused primarily on building development zones to drive large cities' development, or "development zone-driven development of large cities." Urbanization during this period was characterized as large cities expand rapidly. The number of cities increased from 479 in 1991 to 640 in 1995. In the boom of building development zones and promoting urban real estate market, China urbanized fairly quickly. Urbanization level increase from 26.41 % in 1990 to 29.04 % in 1995.

#### 2.4.1.7 The Urbanization Guidelines of "Strictly Controlling the Development of Large Cities, Encouraging the Development of Small Cities and Townships" in the Ninth "Five-Year Plan"

From 1996 to 2000, the ninth "Five-Year Plan" was implemented. The State Council approved on June 10, 1997 "Urban Household Registration System Reform Plan" and "Opinions on Improving the Rural Household Registration System" proposed by the Ministry of Public Safety. The documents specifically indicated that the local authorities shall "allow farmers who have already been employed in small towns, and meet certain conditions to register the permanent residence in small towns." In so doing, we will be able to "promote rural surplus labor to orderly transfer to nearby small towns, which will eventually promote the comprehensive development of small towns and rural areas." In July, 2000, CPC and the State Council promulgated the "CPC Central Committee on the Opinions of Promoting the Healthy Development of Small Towns," which again emphasized the urbanization guidelines in China shall strictly control the development of large cities, but actively encourage the development of medium-sized and small cities and towns. Under such urbanization guidelines, the number of small towns in China had increased explosively from 17,532 in 1995 to 20,312 in 2000. The number of cities, however, remained relatively stable, changed from 666 in 1996 to 668 in 1997, and then reduced to 663 in 2000. Urbanization level changed from 29.04 % in 1995 to 36.22 % in 2000. China also stepped into the mid-stage of urbanization.

#### 2.4.1.8 The Urbanization Guidelines of "Diversified and Coordinated Development of Large, Medium, Small Cities and Townships" in the Tenth "Five-Year Plan"

In the tenth "Five-Year Plan" (2001–2005), the "Tenth Five-Year Plan for National Economic and Social Development" had for the first time promoted urbanization development to the level of national development strategies. Diversified urbanization was proposed for the first time. The "Plan" clearly stated that "promoting urbanization must follow the objective laws and regulations of urbanization. The level of urbanization must coordinate with the level of economic development and degree of market development. Urbanization shall be ready to adapt, move forward step by step, and go in line with China's contemporary national conditions. The ultimate goals were to coordinate the development among large, medium and small cities and small towns for diverse urbanization development, and gradually form a rational urban system [15]." Specifically, we need to focus on developing small towns with great potential, actively promoting small cities, and improving the function of the regional central cities, encouraging large cities to play the leading role, gradually guiding the orderly development of dense urban areas. During this period, urbanization level increased rapidly from 36.22 % in 2000 to 42.99 % in 2005.

#### 2.4.1.9 The Urbanization Guidelines of "Healthy and Coordinated Development of Large, Medium, Small Cities and Townships" in the Eleventh "Five-Year Plan"

In October 11, 2005, the Communist Party of China (CPC)'s Sixteenth Central Committee adopted the "Suggestions on the 11th Five-Year Plan of CPC Central Committee on National Economic and Social Development" during the fifth Plenary Session. The suggestions clearly stated that current guidelines for developing China's cities need to "promote the healthy development of urbanization, insist coordinated development of cities and towns at all levels and scales, and improve the overall carrying capacity of cities and towns. To achieve these goals, we need to follow the fundamental principles of gradual urbanization, land conservation, intensive development, and rational distribution, to actively and steadily promote urbanization" [16]. On October 15, 2007, the CPC's "17th Congress Report" once again made it very clear that "the urbanization with Chinese characteristics must follow the principles of coordinated urban and rural development, rational distribution, land conservation, complete function, and large city leading smaller ones. In so doing, it is possible to promote the coordinated development among large, medium and small-sized cities and towns. The ultimate goals are to enhance the overall carrying capacity, relying on the foundation of megacities to create urban agglomerations that can benefit larger areas, and cultivate new economic growth pole*."

#### 2.4.1.10 The Urbanization Guidelines of "Coordinated Development of Urban Agglomerations and Large, Medium and Small-Sized Cities and Towns" During the Twelfth "Five-Year Plan"

Following the successful implementation of urbanization guidelines in the previous "Five-Year Plan," the Outline of the Twelfth Five-Year Plan of the PCR's National Socioeconomic Development specifically declares that the New Urbanization shall follow the ground Laws principles of urbanization, namely, principles of coordinated planning, rational distribution, complete function, and large city leading smaller ones. Under the guideline and principles, the New Urbanization will focus on the establishment of radiating urban agglomerations that is based on large cities, but focused on medium- and small-sized cities. Urban agglomeration will be ultimate spatial organization for coordinated development among large, medium, and small cities and towns. There will be five axes, with the Eurasian Land Bridge and Yangtze River as the horizontal axes, and the coastal China, Harbin–Beijing–Guangzhou railway, Baotou–Kunming railway as the vertical axes, on which a few major urban agglomerations will be established and other cities and towns will form a radiating, relatively complete urbanization spatial network pattern. The strategy is to actively and steadily promote urbanization. Urban agglomerations in eastern China shall be oriented for global competition; while in western China, policies will

be focused on establishing urban agglomerations that serve the vast inland regions. Within each urban agglomeration, it is critical to follow scientific principles to plan and assign different industries and urban functions to different cities based on local conditions, historical development trends, and current infrastructure status. With scientific planning and resources allocation, we will be able to mitigate the pressure on the central districts of large cities, while in the meantime strengthen the industrial functions for medium- and small-sized cities, and improve the public services and residential functions for small cities and towns. The structure will enable the integrated and networked infrastructure development for large, medium, and small cities and towns. Specifically, the imminent tasks are to actively exploit the existing development potential for small and medium cities. Priority shall be given to medium- and small-sized cities with obvious advantages, strong resources base, and environment carrying capacity. In addition, we need to pay extra attention to the development of small towns, and gradually develop promising town centers in eastern China, county centers in central and western regions, and major border crossing towns into medium and small cities*.

From the above narration, during the past half a century, China's general urbanization guidelines experienced several adjustments. The general trend of China's urbanization guidelines is toward healthier direction. In the meantime, the current urbanization guidelines still exhibit outdated limitations compared to the principles of New Urbanization.

## *2.4.2 Weakness and Limitation of Current Urbanization Guidelines*

### 2.4.2.1 The Current Urbanization Guidelines Are not Compatible with China's Urban Development Reality

The vast majority of the existing prefecture-level cities in China are large cities (or at least will become large cities in their five-year plans) with urban resident population of 500,000 people. Many county-level cities have also reached the scale of large cities population wise. If the guidelines of strictly controlling the development of large cities continue to be implemented, it will not be conducive to the formation and development of new urban development pattern of all prefecture-level cities, and will also hinder the implementation of New Urbanization strategies. As a matter of fact, although the State has proposed to strictly control the development of large cities for a long time, the effects are rather limited. Based on the statistics from the Sixth Census data, the total number of cities of more than 500,000 people has seen a net increase of 183, from 59 in 1990 to 242 in 2010. Their proportion of the total number of cities increased from 12.63 to 36.83 %. In the big cities, ultra-megacities where the urban population is over 10 million in the urban center emerged from scratch, a net increase of 6. They are Shanghai, Beijing, Chongqing, Tianjin,

Guangzhou, and Shenzhen. Megacities with 5–10 million people increased from 2 in 1990 to 10 in 2010. They are Wuhan, Dongguan, Chengdu, Foshan, Nanjing, Xi'an, Hangzhou, Shenyang, Harbin, and Shantou. Big cities with 2–5 million people increased from 7 in 1990 to 37 in 2010. They are Jinan, Zhengzhou, Dalian, Suzhou (Soochow), Changchun, Qingdao, Kunming, Xiamen, Ningbo, Nanning, Taiyuan, Hefei, Changzhou, Tangshan, Zhongshan, Changsha, Xuzhou, Wenzhou, Guiyang, Urumqi, Wuxi, Zibo, Fuzhou (Fujian), Shijiazhuang, Huai'an, Lanzhou, Linyi, Nanchang, Huizhou (Guangdong), Yantai, Yangzhou, WulanchabuUlaan Chab, Nantong, Haikou, Weifang, Zaozhuang, and Xiangyang [17–21]. Large cities with 1–2 million people increased from 22 in 1990 to 83 in 2010. Large cities with 500,000–1 million people increased from 28 in 1990 to 106 in 2010 (Tables 2.3 and 2.4).

From the analysis of contributions from different cities to China's urbanization, we can see that contributions from cities with populations over 500,000 increased from 27.01 % in 1990 to 46.09 % in 2010. The contribution of medium-sized cities increased from 12.07 % in 1990 to 13.85 % in 2010. The contribution of small cities dropped from 10.72 % in 1990 down to 3.63 % in 2010. The contribution of small towns dropped from 50.2 % from 1990 down to 36.44 % 2010 (as shown in Tables 2.5 and 2.6; Fig. 2.3). In a nutshell, the contribution of large- and medium-sized cities to China's urbanization over the past 20 years has increased from 39.08 % in 1990 to 59.94 % in 2010. In the meantime, the contribution of small cities and towns to urbanization has plummeted from 60.92 % in 1990 to 40.07 % in 2010. Apparently, small cities and town's contributions to China's urbanization do not match the policy emphasis in the current urbanization guidelines, leading to a series of urban disease problems. If the existing urban development guidelines are to be continued, it will not help promote the health of China's urbanization and nor is it conducive to achieve the goals of building a moderately prosperous society.

#### 2.4.2.2 Urban Agglomeration Is not Explicitly Defined or Emphasized in Current Urbanization Guidelines

The existing urban development policy was proposed around the 1980s, when China's urban agglomerations were still in their infancy. After nearly 30 years of development, China's urban agglomerations have emerged to be the nation's key and priority development zones. Not only did they become the nation's dominant economic development strategic areas, but also for 10 consecutive years from 2005 to 2015 (two consecutive five-year plans) will they be the main spatial form to accelerate China's urbanization, dominating the overall pattern of urbanization in both today and in the future [22]. The existing urban development guidelines, however, limited by the Chinese urbanization development stage and history, do not integrate the development of urban agglomerations into the general urbanization development strategies.

**Table 2.3** Change of the numbers of various scale cities in China

| City size | Criteria for classification/10,000 people | 1990 | 1995 | 2000 | 2005 | 2010 | |
|---|---|---|---|---|---|---|---|
| | | | | | | Statistics | Sixth census data |
| Large cities | ≥1000 | 0 | 0 | 0 | 1 | 3 | 6 |
| | 500–1000 | 2 | 2 | 2 | 3 | 8 | 10 |
| | 200–500 | 7 | 9 | 11 | 17 | 33 | 37 |
| | 100–200 | 22 | 21 | 27 | 32 | 80 | 83 |
| | 50–100 | 28 | 43 | 53 | 78 | 106 | 106 |
| Medium-size cities | 20–50 | 117 | 192 | 218 | 243 | 265 | 253 |
| Small cites | <20 | 291 | 373 | 352 | 287 | 162 | 162 |
| Total of cites | ≥20 | 467 | 640 | 663 | 661 | 657 | 657 |
| Total of cites and townships | – | 12,084 | 17,532 | 20,312 | 19,522 | 19,410 | 19,683 |

*Note* limited by statistics, the data before 2000 is the urban nonagricultural population, after 2000, it is the municipal district population

**Table 2.4** Change of the titles of various scale cities in China

| City size | Criteria/10,000 people | 1990 | 1995 | 2000 | 2005 | 2010 | |
|---|---|---|---|---|---|---|---|
| | | | | | | Statistics | Sixth census data |
| | ≥1000 | – | – | – | Shanghai, 1128 | Shanghai, 1343, Beijing, 1181, Chongqing, 1426 | Shanghai, 2231.54, Beijing, 1882.7, Chongqing, 1569.34, Tianjin, 1109.03, Guangzhou, 1107.07, Shenzhen, 1035.79 |
| | 500–1000 | Shanghai, 750, Beijing, 577 | Shanghai, 834, Beijing, 620 | Shanghai, 938, Beijing, 727 | Shanghai, 855, Tianjin, 532, Wuhan, 503 | Tianjin, 807, Guangzhou, 660, Xi'an, 562, Nanjing, 547, Chengdu, 528, Wuhan, 518, Shenyang, 514, Shantou, 510 | Wuhan, 979, Dongguan, 822, Chengdu, 768, Foshan, 719, Nanjing, 717, Xi'an, 650, Hangzhou, 624, Shenyang, 616, Harbin, 588, Shantou, 533 |
| Large cities | 200–500 | Tianjin, 457, Shenyang, 360, Wuhan, 328, Guangzhou, 291, Chongqing, | Tianjin, 474, Shenyang, 379, Wuhan, 376, Guangzhou, 317, Chongqing, | Tianjin, 499, Wuhan, 441, Guangzhou, 401, Shenyang, 395, Chongqing, | Shantou, 484, Guangzhou, 482, Chongqing, 478, Dongguan, 460, Nanjing, | Shijiazhuang, 243, Tangshan, 307, Taiyuan, 285, Dalian, 303, Changchun, 363, Harbin, 473, Wuxi, 238, | Jian, 434, Zhengzhou, 425, Dalian, 410, Soochow, 407, Changchun, 391, Qingdao, 372, Kunming, 355, |

(continued)

**Table 2.4** (continued)

| City size | Criteria/10,000 people | 1990 | 1995 | 2000 | 2005 | 2010 | |
|---|---|---|---|---|---|---|---|
| | | | | | | Statistics | Sixth census data |
| | | 227, Harbin, 244, Nanjing, 209 | 275, Harbin, 252, Nanjing, 226, Xi'an, 216, Chengdu, 200 | 382, Harbin, 264, Nanjing, 256, Xi'an, 253, Chengdu, 228, Changchun, 218, Dalian, 208 | 411, Shenyang, 410, Chengdu, 388, Xi'an, 310, Harbin, 308, Jinan, 273, Qingdao, 265, Changchun, 246. Hangzhou, 246, Dalian, 241, Shijiazhuang | Xuzhou, 312, Changzhou, 227, Soochow, 241, Nantong, 212, Huai'an, 276, Hangzhou, 432, Ningbo, 222, Hefei, 214, Fuyang (Anhui), 206, Putian, 214, Nanchang, 222, Jinan, 348, Qingdao, 276, Zibo, 279, Zaozhuang, 221, Linyi, 202, Zhengzhou, 298, Xiangyang, 223, Changsha, 241, Shenzhen, 253, Foshan, 369, Nanning, 268, Guiyang, 220 | Xiamen, 353, Ningbo, 349, Nanning, 343, Taiyuan, 336, Hefei, 335, Changzhou, 329, Tangshan, 319, Zhongshan, 312, Changsha, 309, Xuzhou, 305, Wenzhou, 304, Guiyang, 304, Urumqi, 304, Wuxi, 301, Zibo, 298, Fuzhou (Fujian), 292, Shijiazhuang, 286, Huai'an, 263, Lanzhou, 263, Linyi, 260, Nanchang, 236, Huizhou (Gangdong), 235, Yantai, 223, Yangzhou, 221, Wulanchabu, 214, Nantong, 209 |

(continued)

**Table 2.4** (continued)

| City size | Criteria/10,000 people | 1990 | 1995 | 2000 | 2005 | 2010 | |
|---|---|---|---|---|---|---|---|
| | | | | | | Statistics | Sixth census data |
| | | | | | 224, Taiyuan, 216, Wuxi, 210 | Kunming, 264, Lanzhou, 210, Urumi, 233 | Haikou, 205, Weifang, 204, Zaozhuang, 204, Xiangyang, 203 |
| | 100–200 | Xi'an, 199, Dalian, 172, Chengdu, 171, Changchun, 168, Taiyuan, 153, Jinan, 146, Qingdao, 146, Anshan, 120, Fushun, 120, Lanzhou, 119, Zhengzhou, 116, Zibo, 114, Kunming, 113, Changsha, 111, Hangzhou, 110, Nanchang, 109, Qiqihar, 107 | Changchun, 195, Dalian. 188, Taiyuan, 169, Qingdao, 166, Jinan, 164, Zibo, 140, Zhengzhou, 136, Lanzhou, 133, Anshan, 127, Kunming, 126, Fushun, 125, Changsha, 123, Shijiazhuang, 122, Hangzhou, 121, Nanchang, 119, Urumqi, 115, | Taiyuan, 185, Qingdao, 184, Jinan, 180, Zhengzhou, 160, Kunming, 150, Zibo, 148, Lanzhou, 148, Shijiazhuang, 145, Hangzhou, 144, Changsha, 144, Nanchang, 134, Urumqi, 131, Guiyang, 131, Anshan, 129, Tangshan, 126, Fushun, 125, Jilin, 124, Baotou, l13, | Tangshan, 166, Handan, 122, Datong, 111, Baotou, 113, Anshan, 129, Fushan, 127, Jilin, 126, Quiqihar, 112, Xuzhou, 150, Changzhou, 110, Soochow, 142, Huai'an, 117, Suqian, 109, Ningbo, 121, Hefei, 150, Fuzhou (Fujian), 146, Nanchang, 167, Zibo, 143, Yantai, 126, Linyi, 139, Zhengzhou, 188, Luoyang, | Handan, 148, Baoding, 106, Datong, l55, Hohhot, 120, Baotou, 142, Wuhai, 121, Anshan, 147, Fushun, 148, Jilin, 184, Qiqihar, 142, Daqing, 132, Yancheng,163, Yangzhou, 122, Zhenjiang, 104, Suqian, 160, Wenzhou, 145, Huzhou, 109, Taizhou (Zhejiang), 155, Wuhu, 108, Huainar, 181, Huaibei, 109, Suzhou, 185, Lu'an, l86, | Hohhot, 198, Baotou, 198, Jilin, 198, Putian, 195, Luoyang, 193, Taizhou (Zhejiang), 190, Nanchong, 186, Nanyang, 181, Huainan, 177, Datong, 174, Tai'an, 174, Fuyang(Anhui), 168, Bayannur, 167, Anshan, 167, Quanzhou, 166, Daqing, 165, Suzhou, 165, Lu'an, 164, Yancheng, 161, Zhanjiang, 159, Fushun, 158, Zhuhai, 156, Qiqihar, 155, Shangqiu, 154, |

(continued)

**Table 2.4** (continued)

| City size | Criteria/10,000 people | 1990 | 1995 | 2000 | 2005 | 2010 | |
|---|---|---|---|---|---|---|---|
| | | | | | | Statistics | Sixth census data |
| | | | | Qiqihar, 112, Fuzhou (Fujian), 112, Xuzhou, 109, Hefei, 108, Handan, 105 | 107, Changsha, 173, Shenzhen, 182 | Bozhou (Anhui), 161, Fuzhou (Fujian), 187, Xiamen, 179, Quanzhou, 103, Yichun, 105, Fuzhou (Jiangxi), 113, Yantai, 179, Weifang, 182, Jining (Shandong),112, Tai'an, 159, Rizhao, 123, Laiwu, 129, Liaocheng, 115, Heze, 140, Luoyang, 163, Pingdingshan, 103, Anyang, 109, Xinxiang, 101, Luohe, 135, Nanyang, 187, Shangqiu, 175, Xinyang, 147, Yichang, 125, Ezhou, 104, Jingzhou, 115, Hengyang, 104, Yueyang, 108 | Guigang, 149, Changde, 146, Handan, 144, Baoji, 143, Suqian, 144, Liuzhou, 144, Yichang, 141, Bozhou (Anhui), 141, Luzhou (Sichuan), 137, Mianyang, 135, Heze, 134, Chifeng, 133, Jining (Shandong),132, Rizhao, 132, Wuhu, 131, Laiwu, 130, Suining, 130, Luohe,129, Huzhou, 129, Yinchu, 129, Zigong, 126, Neijiang, 125, Yiyang, 125, Yueyang, 123 |

(continued)

**Table 2.4** (continued)

| City size | Criteria/10,000 people | 1990 | 1995 | 2000 | 2005 | 2010 | |
|---|---|---|---|---|---|---|---|
| | | | | | | Statistics | Sixth census data |
| | | Urumqi, 105, Tangshan, 104, Jilin, L04, Guiyang, 102 | Guiyang, 115, Jilin, 114, Tangshan, 112, Qiqihar, 111, Baotou, 104 | Luoyang, 104, Shenzhen, 100 | Jiangmen, 134, Maoming, 121, Huizhou (Guangdong), 115, Nanning, 128, Guiyang, 148, Lanzhou, 171, Kunming, 170, Urumqi, 150 | Changde, 14 l, Yiyang, l33, Yongzhou, 115, Zhuhai, 103, Jiangmen, 138, Zhanjiang, 149, Maoming, 132, Dongguan, 180, Zhongshan, 148, Liuzhou, 104, Qinzhou, 135, Guigang, 188, Hezhou (Guangxi), 110, Laibin, 106, Haikou, 159, Zigong, 150, Luzhou (Sichuan), 146, Mianyang, 122, Suining, 151, Neijiang, 142, Leshan, 115, Nanchong, 193, Guang'an, 126, Bazhong, 141, | Xinyang, 123, Liaocheng, 123, Maoming, 122, Leshan, 121, Jiaxing, 120, Zhenjiang, 120, Qinzhou, l20, Xining, 119, Tianshui, 120, Jingzhou, 115, Anyang, 115, Hengyang, 113, Bazhong, 113, Huaibei, 111, Baoding, 110, Zuyi, 110, Benxi,109, Fuzhou (Jiangxi), 109, Jinhua, 108, Zhangjiakou, 106, Yulin (Guangxi), 106, Zhuzhou, 106, Lianyungang, 105, Ezhou, 105, |

(continued)

**Table 2.4** (continued)

| City size | Criteria/10,000 people | 1990 | 1995 | 2000 | 2005 | 2010 | |
|---|---|---|---|---|---|---|---|
| | | | | | | Statistics | Sixth census data |
| | | | | | | Ziyang, 109, Baoji, 142, Ankang, 100, Tianshui, 128, Wuwei, 101, Xining, 114 | Xinxiang, 105, Yichun, 105, Pingdingshan, 103, Qinhuangdao, 103, Jinzhou, 102, Huludao, 102, Wuwei, 101, Yongzhou, 101, Hezhou (Guangxi), 101, Dongying, 100 |
| | 50–100 | 28 | 43 | 53 | 78 | 106 | 106 |
| Medium-size cities | 20–50 | 117 | 192 | 218 | 243 | 265 | 265 |
| Small cites | <20 | 291 | 373 | 352 | 287 | 162 | 162 |
| Total | | 467 | 640 | 663 | 661 | 657 | 657 |

*Note* the data of 2010 is the urban nonagricultural population, the data of 2010 from the 6th National Population Census is the municipal district resident population

**Table 2.5** Population change in various scale cities in China/10,000 people

| City size | Criteria/10,000 people | 1990 | 1995 | 2000 | 2005 | 2010 |
|---|---|---|---|---|---|---|
| Large cities | ≥1000 | 0 | 0 | 0 | 1128.37 | 3944.98 |
| | 500–1000 | 1326.34 | 1453.2 | 1665.09 | 1890.92 | 4646.11 |
| | 200–500 | 2117.73 | 2716.2 | 3542.36 | 5654.76 | 7895.32 |
| | 100–200 | 2813.9 | 2826.5 | 3349.77 | 4416.32 | 6955.39 |
| | 50–100 | 1899.4 | 2969.5 | 3591.35 | 5171.25 | 7426.67 |
| Medium-size cities | 20–50 | 3644.25 | 5783.7 | 7267.37 | 8505.34 | 9275.56 |
| Small cites | <20 | 3236.18 | 4266.7 | 5309.89 | 5568.13 | 2430.12 |
| Total of cites | | 15,037.8 | 20,015.8 | 24,725.83 | 32,335.09 | 42,574.15 |
| Total urban population | | 30,195 | 35,174 | 45,906 | 56,212 | 66,978 |
| Total population | | 114,333 | 121,121 | 126,743 | 130,756 | 134,091 |

*Note* limited by statistics, the data before 2000 is the urban nonagricultural population, after 2000, it is the municipal district population

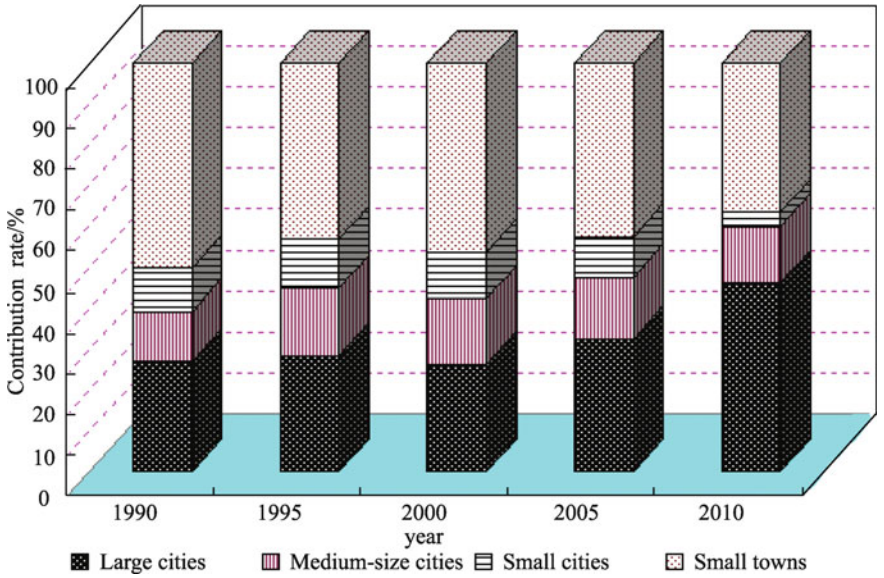


**Fig. 2.3** Changes of various scale cities' contribution to China's urbanization in the past two decades

#### 2.4.2.3 Demarcation of Large, Medium and Small Cities in the Current Urbanization Guidelines Is not Entirely Reasonable

Demarcation of various scales of cities in the current urbanization guidelines is somewhat outdated. In particular, the standard for large cities does not agree with the reality. In 1984, China attempted a new trial standard for cities and towns. The main contents of the new regulations are that the village government can upgrade to township if the nonagricultural population is more than 2000 people. If nonagricultural population is over 60,000 or more, with an annual GNP of over 200 million RMB yuan, it will be established as a city. County-level cities with nonagricultural population of 100,000 or more, nonagricultural industries account for 60 % or more of local GNP and an annual GNP over 300 million RMB yuan or more, it will be established as prefecture-level cities. In Article 4 of the "People's Republic of China Urban Planning Law" issued in 1989, it is established the State would strict control the size of large cities, focus on developing medium-sized cities and small cities. Large cities refer to nonagricultural population in the urban and near suburban areas that are over 500,000. Medium-sized cities refer to nonagricultural population between 200,000 and 500,000. Small cities refer to cities with less than 200,000 nonagriculture population [23]. But this law was repealed in January 1, 2008. The new "People's Republic of China Urban and Rural Planning Act" does not have specific numbers to define size of the city. In Article 4, however, it is

**Table 2.6** Comparison of various scale cities' contribution to China's urbanization/%

| City size | Criteria/10,000 people | 1990 | 1995 | 2000 | 2005 | 2010 |
|---|---|---|---|---|---|---|
| Large cities | ≥1000 | 0 | 0 | 0 | 2.01 | 5.89 |
| | 500–1000 | 4.39 | 4.13 | 3.63 | 3.36 | 6.94 |
| | 200–500 | 7.01 | 7.72 | 7.72 | 10.06 | 11.79 |
| | 100–200 | 9.32 | 8.04 | 7.3 | 7.86 | 10.38 |
| | 50–100 | 6.29 | 8.44 | 7.82 | 9.2 | 11.09 |
| Medium-size cities | 20–50 | 12.07 | 16.44 | 15.83 | 15.13 | 13.85 |
| Small cites | <20 | 10.72 | 12.13 | 11.57 | 9.91 | 3.63 |
| Townships | – | 50.2 | 43.09 | 46.14 | 42.48 | 36.44 |
| Total | | 100 | 100 | 100 | 100 | 100 |
| National urbanization level | | 26.4 | 29.1 | 36.2 | 42.9 | 49.9 |

mentioned that "local governments at the county or above level shall reasonably determine the overall development scale, steps and construction standards of cities and towns according to local economic and social development in the master urban and town planning" [24]. In the absence of clear rules, urban development tends to expand the spatial scale endlessly. At present, since urban population is no longer calculate based on the nonagricultural population, on the permanent resident population, urbanization level, urban scale, and classification criteria/standards are fairly inconsistent due to different calculation methods. This is especially true for cities that have population over 1 million, 5 million, or even 10 million people. The standards for urban infrastructure and public service facilities in these cities are still treated as being equivalent to that of a large city, which was initially defined as cities with over 500,000 people. This is apparently unreasonable, and is also one of the main reasons leading to a series of urban disease in big and megacities.

#### 2.4.2.4 The Urban Hierarchical Structure Under the Current Urbanization Guidelines Is Not Compatible with the Administrative Division

The size of a city directly affects the overall urban planning, sizes of population and construction land, and the scale and standard configuration of infrastructure and public service facilities. Reasonable size of a city is an important prerequisite for urban construction, and improving the operating efficiency of the city. Different cities with different administrative levels have different investment intensity and administrative privileges. For over 30 years, the total number of all types of city increased from 223 in 1980 to 656 in 2011, including municipalities from three to four, sub-provincial cities from zero to 15, prefecture-level cities from 107 to 268, and county-level cities from 113 to 369 [25] (Table 2.7).

**Table 2.7** China's urban administrative division changes (counts)

| City size | 1980 | 1985 | 1990 | 1995 | 2000 | 2005 | 2010 | 2011 |
|---|---|---|---|---|---|---|---|---|
| Municipalities | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 4 |
| Sub-provincial cities | – | – | – | 16 | 15 | 15 | 15 | 15 |
| Prefecture-level cities | 107 | 162 | 185 | 194 | 244 | 268 | 268 | 268 |
| County-level cities | 113 | 159 | 279 | 427 | 400 | 374 | 370 | 369 |
| Total | 223 | 324 | 467 | 640 | 663 | 661 | 657 | 656 |

By simply comparing the numbers, we can see that in 2010, the ratio between sub-provincial level cities, prefecture-level cities, and county-level cities in China was 2.89 %:40.79 %:56.25 %. In the same year the ratio between large cities, medium cities, and small cities was 35.01 %:40.33 %:24.66 %. Apparently, there is a clear lack of coordination between these two ratios. Due to difficulty to adjust administrative divisions, there are towns in eastern China with permanent population over 200,000–500,000 people, but still established as towns from an administrative perspective and the standards for infrastructure and public service facilities are set at town level. This apparently causes those towns to be overburdened and overcrowded.

## *2.4.3 Strategic Guidelines for the New Urbanization*

Article 23 of the "CPC Central Committee Decisions on Major Issues in Deepening Reform" announced in the Third Plenary Session of the Party's Eighteenth Conference clearly stated that one of the primary missions in the New Urbanization is to implement innovative population management system, accelerate the reform of the household registration system, fully relax registration restrictions for towns and small cities, gradually relax registration restrictions for medium-sized cities, reasonably determine registration conditions for large cities, but still strictly control urban population in big and megacities. In addition, it is imperative to establish a unified construction land market, improve the secondary market for land lease, transfer, and mortgage. This expression sets the policy foundation for the adjustment to China's New Urbanization.

### 2.4.3.1 Increase the Urban Scale Classification Standards Appropriately, Establish Six Different Scales

Based on the fact that China's overall urban development scale is too large, it is recommended to increase the size criteria for various cities based on national resources and environment carrying capacity and urbanization conditions. The basis

for classifying different urban scales shall be based on urban resident population that was served by urban infrastructure and public service facilities. In particular, we suggest dividing Chinese cities into six different sizes, namely,

Supercities: Urban resident population size ≥10 million;
Megacities: the urban resident population is between 5 million and 10 million people;
Large cities: the urban resident population is between 1 million and 5 million people;
Medium-sized cities: the urban resident population is between 500,000 and 1 million people;
Small cities: the urban resident population is between 100,000 and 500,000 people;
Small towns: township resident population size <100,000.

The standards for urban infrastructure and public service facilities in various cities shall be configured based on the population sizes. Specifically, cities that are classified based on population sizes shall not share the standards nor have to fit with municipalities, prefecture-level cities, county-level cities, and administrative-townships. In other words, cities and county-level cities can become large cities and megacities, towns can also be medium-sized cities or small cities, and even large cities if residential population size reaches the standard. On the contrary, the provincial capital cities do not necessarily have to be megacities or supercities. Prefecture-level cities do not necessarily have to be large cities or megacities; they may be small cities or medium-sized cities.

With these criteria and standards in mind, it is suggested that the building departments shall determine the land-use and infrastructure configure standards based on the actual size of the cities, instead of the administrative levels.

#### 2.4.3.2 Promote the New Urbanization Development Guidelines

Using the six city classes as outlined above, and the proposal of promoting healthy urbanization in the Eleventh and Twelfth "Five-Year Plans" and considering the development of both urban agglomerations and small cities [26], we propose the guidelines for New Urbanization as "to strictly control the two "Big ones" (mega- and supercities), and encourage the two "Small ones" (small cities and towns)" promote "urban agglomeration," rationalize spatial distribution, and balance development among various cities. In particular, the primary goals are to guide the development of urban agglomerations, strictly control the mega- and supercities, rationally develop large cities, encourage the development of medium-sized cities, and actively develop small cities and small towns. Ultimately, we intend to build a spatial urban pattern with coordinated development among urban agglomerations and large, medium, and small cities and small towns. Urban agglomerations will continue to be the main space form that will promote actively and steadily the development of China's urbanization. Small towns will serve as the primary means

to promote urban and rural development, sustainably sustainable conversion of farmers to citizens, and gradual improvement of urbanization quality.

#### 2.4.3.3 Adjust the Structure of Urban Systems, and Optimize the Spatial Patterns of Urbanization

With the adjustment of national urban development policies, we suggest adding four hierarchies, namely, urban agglomerations, supercities, megacities, and small towns, in the national structure of urban systems. In so doing, the national structure of urban system will have seven layers, from top to bottom: urban agglomerations–supercities–megacities–large cities–medium-sized cities–small towns. Based on the structure, the national urban system hierarchy will be national key urban agglomerations (first grade centers), national central cities (second grade centers), national regional central cities (third grade centers), regional central cities (fourth grade centers), regional subcentral cities (fifth grade centers), and national key small towns (sixth grade centers). The national urban system's functional and spatial structure shall also be adjusted based on the adjusted national urban hierarchical system [27] to continue to optimize the spatial pattern of urbanization development in China.

#### 2.4.3.4 Dialectically Analyze the Pros and Cons of Migrant Workers in the Cities and College Graduates to the Countryside, Improve Urbanization Development Quality

There are views that the urbanization policies shall allow most (if not all) migrant workers to stay as urban citizens. Such views, however, could be rather biased and one-sided. First, it is neither wise nor possible to allow all 260 million migrant workers to move to and stay in the city. Many of these migrant workers do not necessarily want to permanently reside in the city. Working in the cities is but one way (lucrative and with more opportunities, that is for sure) to earn money. Their ultimate goals are to build a house in their hometown. These migrant workers just want to continue to do migrant work. Second, being a migrant worker can purchase houses in the cities, yet in the meantime, they can retain their homestead lands in rural areas. Third, the majority of migrant workers have rather limited educational level. According to the National Bureau of Statistics, among the 260 million migrant workers, only 25 % received nonagricultural vocational and technical training, more than 60 % barely graduated from middle school* (Southern People Weekly, 2013, 34, 21). If we force these migrant workers to rush into the city, there will be a de facto decrease of China's urbanization quality, which is directly against the current urbanization policy to treat improving the quality of development as the top priority. Fourth, there were suggestions that cities shall lower the quota of college graduates to ensure that migrant workers can stay in cities. Such suggestions are most likely going to work against improving urbanization quality.

In addition, other than suggestions that allow migrant workers to become urban citizens, many have viewed allowing college graduates to work in the rural areas as local chief executives being a successful approach to control the sizes of mega- and supercities. Such views, unfortunately, are rather groundless. In municipalities and a few mega- and supercities, such practices are relatively successful. In other areas, however, they are basically unsuccessful. In a nutshell, allowing college graduates to work as local chief executives is really a waste of China's higher education resources. Although at least one-third of college graduates worked as local chief executives, while in fact the real time they spent in their allocated villages was less than 2 months a year. Therefore, from the point of view of improving China's urbanization quality, we recommend a modest reduction of migrant workers to the cities and college graduates to the villages.

#### 2.4.3.5 Legalize the Guidelines of New Urbanization Development to Urban and Rural Planning Act

China's urbanization process is now facing increasingly severe pressure on resources and the environment. The future urbanization process must treat enhancing the quality of urbanization as the topmost priority [28]. The most important tasks are to relieve and cure urban disease. To do so, it requires rigorous and scientific attitude to study the theory, practice, and laws of urban development, and formulate corresponding scientific development policies and guidelines for urban development. Considering that the new "Urban and Rural Planning Act" has deleted the descriptions about urban development guidelines as outlined in "Urban Planning Act," we suggest adding more in-depth contents of the urban development policies and guidelines to legalize such policies and guidelines [29]. In so doing, healthy urbanization in China will have both the legal and scientific support.

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# Chapter 3
# Basic Modes for China's New Urbanization Development

Urbanization in China has entered a critical period of rapid development and transformation. The keys for this critical period include urbanization level is over 50 %; outstanding "urban disease" issues push for improvement of urbanization quality; accelerating urbanization is facing increasing resource and environmental pressures; and urbanization needs to be coordinated with industrialization, agricultural modernization and information technology development. In this critical period of transition, in order to ensure a successful transition of urbanization and the healthy and stable development, the New Urbanization strategy proposes a shift from the aggressive to progressive and from unsustainable to sustainable urbanization. In so doing, appropriate urbanization restructuring modes, including generic transition, differentiating transition, shareholding transition, gradual transition, and spontaneous transition will be implemented depending on local conditions. Except for the generic transition mode, there is no uniform mode of transition for urbanization in China. The golden principle is that we must adhere to local conditions, and let the local regions walk their own development path of implementing the New Urbanization strategy.

## 3.1 The Generic Transition Mode for China's New Urbanization Development

Given the fact that China's urbanization is entering a critical period of transition with relatively low security level of ecological and environmental protection and resources in the near future, appropriate urbanization mode must adhere to the basic principles of moderately compactness, resources conservation, environment protection, differentiating promotion, and full openness. Based on these principles, the actual characteristics of the generic transition mode for urbanization in China can be described as being compact with appropriate rate and scale [1], resources and



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energy conserving, eco-environmental friendly, local conditions abiding, urban and rural integrating, and fully open and leading. The generic transition mode provides the most fundamental guidelines for the New Urbanization in China, and can be applied to all regions, cities, and time periods.

## *3.1.1 Appropriate and Compact Urbanization*

This common mode requires properly handling the relationship between improving urbanization quality and rate, so that the rate of urbanization is within the current allowed limit as determined by local resource and environmental carrying capacity. Moreover, this mode also emphasizes that urbanization level shall be consistent with urban economic development level. High quality of urbanization is impossible without high quality of economic development. This then calls for relatively accurate predictions of both the urbanization and economic development levels. We shall gradually de-emphasize the importance of urbanization level alone; instead highlight the significance of resource and environmental constraints for urbanization. The key is to maintain an appropriate growth rate of urbanization that is neither too fast nor too slow. Our empirical analysis suggests an annual growth rate of 0.6–0.8 % for urbanization is appropriate in current China. Since healthy urbanization is really a comprehensive and integrated process of enhanced quality and rate, it is critical to maintain such a not-too fast but not-too slow pace. If urbanization is too fast, it would lead to the development exceeding the carrying capacity of the local ecological environment and resources, triggering a series of ecological and environmental problems, which in turn limits further acceleration of future urbanization. This is also called excessive urbanization. On the other hand, if urbanization is too slow, although low level of urbanization has relatively little impact on the ecological environment, it limits the industrialization and economic development, which also lead to a low level of non-agricultural economy, lagging urban construction, a large surplus of labor, and inefficient society. This is also called under-urbanization. Apparently, neither the excessive urbanization nor the under-urbanization would be appropriate, healthy and sustainable urbanization. The moderate urbanization in between refers to the fact that urbanization level adapts to local resource and eco-environment carrying capacity, hence is the appropriate mode for urbanization. In a nutshell, such moderate mode of urbanization has a few distinctive characteristics, namely, moderate urbanization rate, moderate scale of urban construction, moderate urban agglomeration and diffusion, and moderate urban compactness.

### 3.1.1.1 Moderate Rate of Urbanization

The moderate rate is not a specific, definite rate. Instead, the moderate rate refers to the rate of urbanization that is compatible and coordinated with economic growth,

employment, land use, and other factors in specific phases and stages of economic development and urban development. With moderate urbanization rate, cities shall be able to create enough jobs as well as maintain a high quality of living environment. The ultimate goal of urbanization is to develop a life and production style that seeks the least from the nature, but produce the highest quality of life. Urbanization with moderate rate will have rational urban space utilization patterns. The current rapid urbanization that generates the so-called "three-no" phenomenon, namely, urbanized farmers have no cultivable land, no job available, and no employment opportunities, is apparently an excessive urbanization that focuses only on numbers, and is unhealthy and is directly against the inherent laws of urban development [2–4]. Apparently, rapid urbanization is not necessarily good urbanization. As a matter of fact, countries in Africa and Latin America have experienced the fastest urbanization rate during the past decades. They are, however, still the world's poorest regions. The fact suggests that urbanization needs to advance moderately. The rate shall allow urbanization to progress within the limit of local resource and environmental carrying capacity, and to follow the objective laws of urban development and economic development. Too aggressive urbanization is neither healthy nor sustainable. In analogy, urbanization process is like riding a bicycle, riding too fast or too slow will always cause the bike to crash in the end.

In a recently published monograph, "China's New Urbanization study" [13], the authors believe that the CPC's 18th Congress Report on people-oriented New Urbanization strategy has put forward new requirements. They argue that New Urbanization is China's modern grand strategy, and also the new government's "trump card" to promote economic development and social progress. They further contend that from a historical development perspective, China is entering a new height of development, and is facing with a series of important questions regarding New Urbanization and national reform. The book further proposed that by the year 2030, China's urbanization level will reach 80 % [5] to solve the series of new urban issues and problems. Such proposal, especially the 80 % urbanization level prediction, however, we believe is rather irresponsible and could further facilitate the on-going number's game that causes the series of urban issues and problems from the start. From a resource and environmental carrying capacity perspective (the most fundamental perspective), imagine if more than 80 % of China's current gigantic population concentrated in the cities, none of the cities in China will be prepared for such huge inundation of increased residents. The end results are quite foreseeable that cities in China will endure a variety of urban diseases like the ones troubling African and Latin American cities. Such proposal and ensuring strategies could very possibly put China's urbanization to the edge of disaster. In addition, even if the cities will be able to accommodate 80 % of China's population in 2030, under the current agricultural technology, the food security for 1.3 billion–1.5 billion people will be impossible to maintain. Apparently, at least in the foreseeable future in China, such a proposal is more of a whimsical self-imagination and overly aggressive approach for urbanization, a result from the legacy number's game that has been dominating China's traditional urbanization during the past decades. Such

proposal does not comply with China's national conditions at all, and shall be treated with high caution.

#### 3.1.1.2 Moderate Urbanization Scale

In the process of implementing New Urbanization, one misconception that needs to be rectified is that the scale of urban population and urban construction land are grander the better. This is a typical legacy of number's game that governs the traditional urbanization strategies. From a sustainable development perspective, we must realize the resources and eco-environment carrying capacities are limited instead of infinite. If the scale of urbanization (population or land) is over and beyond the carrying capacity of resources and ecological environment, the cost for urban infrastructure will increase dramatically (financially and environmentally). In addition, the too-spread-out land use strategy also reduces urban land use efficiency, wastes city resources, increases urban environmental pollution, and causes a series of urban diseases. On the other hand, restricting the scale of urban construction land does not mean that the scale is smaller the better. Indeed, if a city appears too small, it is probably an indication of potential lack of urban development and weak urban radiating and diffusing effects, which will severely limit the central functions of the city to be played properly. From this elaboration, we argue that moderate scale of urbanization is when the city population size and scale of construction land are based on local resource endowments and environmental infrastructure, economic and social development, and regional characteristics. Under the moderate scale principle, urbanization cannot exceed the capacity provided by economic development. As a matter of fact, with excessive urbanization, the urban economy will not be able to provide sufficient amount of employment opportunities to accommodate its excessive population. If the urban land expands too extensively, the land resources utilization efficiency will be low. This is both a waste of urban resources and land resources. Based on our studies and analyses, we propose the future urban construction land per capita should be controlled between 80 and 100 $m^2$.

#### 3.1.1.3 Moderate Concentration and Diffusion

Economies of scale and agglomeration effects are fundamental characteristics of the city and urban development, and also a direct goal of urbanization. In the early stages of urban development, it is necessary to emphasize the concentration of various factors of production to the central places. Once such concentration accumulates to certain extent, specifically when the combined effect of a series of negative results due to agglomeration offsets its benefits, it is necessary to promote out-diffusion of various factors of production. Otherwise, we are bound to observe a series of urban diseases. On the contrary, if we purposefully push production factors and population out of the cities in the early stage of urban development, it will cause a lack of cohesion and solidarity of the cities, which also leads to unhealthy

urbanization. Apparently, over-agglomeration or excessive fragmentation will not be conducive to the healthy development of urbanization. A healthy and sustainable urbanization approach shall adhere to the principles of moderate concentration and diffusion.

#### 3.1.1.4 Moderate Compactness of Urbanization

Compact city is a resource saving, efficient, and high-density city. On the other hand, compact city is not necessarily environmental friendly or eco-city. It depends on how concentrated or diffusive are the city's various elements, such as industrial production, transportation, economy, space, and demographic agglomeration. Urban compactness is an often used indicator to measure the extent of the city's compactness. Compact city is often regarded as a sustainable form for urban development. It stems from the theories of the European-based Western countries on how to control urban sprawl and promote sustainable urban development. The theory stresses development. Under the precondition of curbing urban sprawl, the theory proposes centralized and sustainable utilization of public facilities to effectively reduce transportation distances, pollution emissions, and promote urban development [6]. Haughton and Hunter believe that higher urban density helps establish economically viable municipal facilities and promote sustainable development of society [7]. On the other hand, Breheny [1] considers compact city to be and an overcrowding, urban open space lacking living environment. The compactness is achieved by sacrificing the quality of urban life, and causing more energy consumption and pollution [8]. Li Lin compared the terms "compactness" and "intensive-ness" in juxtaposition and concluded that "compactness" is not a concrete, specific urban form, but an urban development strategy [9]. Qiu [10] compared the two arguments regarding too much or too little compactness, and proposed the compactness of the city is the core concept of sustainable development in China, and the primary condition to build a resource saving and environmental friendly city. It is hence recommended for healthy urbanization in China. Qiu further proposed that promoting the strategy of compact city in China will be able to achieve the comprehensive goals of land, energy, water, and materials saving, to build a resource conserving, environmental friendly city, so that we will be able to achieve a harmonious, rational, and healthy urbanization in the long run [10]. From these arguments, it can be seen that moderate urban compactness epitomizes the maximization of the overall efficiency. Urban form being too compact or too diffusive will neither be conducive to the healthy development of the city, nor to a healthy urbanization.

### 3.1.2 Resources and Energy Conserving Urbanization

This generic mode requires that urbanization must progress within the limits of resource and environment carrying capacity so that urbanization's impact on resources and environment will be kept at the minimum. In the meantime, appropriate planning and investment in technological innovation will also facilitate to relax the restriction of environment and resources on urbanization. The general principle is to promote resource conserving, environmental friendly, and clean urbanization based on local resource and environmental carrying capacity. Specifically, during the process of implementing the master urban planning, we must emphasize the variables that define urbanization quality and variables that reflect resource and environment constraints. In particular, indicators such as energy, water, construction land consumption, and pollutant emissions per 1 % of urbanization shall be considered as the same constraints such as unit GDP energy, water consumption, and pollutant emissions. For each of those variables, we must set clear reduction goals and control standards.

From the resource and energy availability and carrying capacity perspective, the land resource is the main carrier of the New Urbanization strategy. Water resource is the lifeblood of the New Urbanization. Energy resource is the lifeline of New Urbanization. In a nutshell, land, water, energy, and other resources are the extremely important guarantees for sustainable urban and regional development. Lessons learned from other countries' experience indicate that arable land reduced the fastest in the rapid development stages of industrialization and urbanization. Moreover, with further development of urbanization and industrialization, and upgraded consumption level after citizens' income growth, the demand for land resources and energy resources will rapidly increase. Urbanization development will inevitably face greater resources and environment pressure. To prevent such pressure escalates to be unsustainable, urban development must follow the route of intensive resources use, centralized urban layout, and compact development patterns. While choosing various development modes, conservation of resources and the environment shall take the highest priority. For development values, environmental protection shall take the top priority. Building a resource saving society shall be the preferred choice for any New Urbanization planning strategies. China's national conditions dictate that we cannot walk the same path of urbanization as the US and Latin America did. Urbanization in North America vividly demonstrates the waste of resources and degradation of regional eco-environments due to uncontrolled and disordered urban sprawl and low density land use pattern. Latin American countries had a much higher urbanization level than their economic development level. The rapid increase of urban population quickly surpassed what the urban infrastructure and public service facility could accommodate. This caused the majority of people live in harsh environments in cities. A large number of urban residents lack of formal employment and basic social security. The actual quality of urbanization is very low, let alone developing modernized cities. Therefore, during the process of urbanization, we must implement resource saving urbanization mode.

Specifically, such mode encompasses water-saving, land-saving, material-saving, and energy-saving and consumption reduction.

#### 3.1.2.1 Implementing Water-Saving Urbanization; Urbanization Rate and Level Shall Be Determined by the Amount of Available Water

Water-saving urbanization refers to promoting urbanization from the perspective of water resources carrying capacity. In this mode of urbanization, there is a scientifically determined restriction for water demand and the scale and rate of socioeconomic development. This mode of urbanization focuses on developing and popularizing water-saving technology, establishing a water-saving system of industrial structure, and comprehensively promoting a water-saving society. The scale of the cities (large, medium, and small) is determined by the availability of water so that the new urban system progresses within the limits of the entire system's water carrying capacity. In the meantime, it will also strive to ensure that urban development and population, resources, and environment are coordinated. Water-saving shall be implemented and enforced in both regions with strong water resource constraint, and regions with weak constraint, and also in agricultural, industrial, and daily life. During urbanization process, after fully taping the potential of local water resources, and ensuring basic ecological and environmental water demand, we can then set the strategies to determine the scale of the city, the amount of urban land needed, the appropriate population size, the proper productivity, and the moderate rate and level of urbanization based on available water resources.

#### 3.1.2.2 Implementing Land-Saving Urbanization; Urbanization Rate and Level Shall Be Determined by the Amount of Reasonably Available Land

Urban sprawl has attracted urban scholars' attention for quite some time. Apparently, urban sprawl is not a healthy type of urbanization, instead a disorderly expansion due to the inherent drive of land marketization. An orderly and health urbanization is supposed to be a controlled process that intentionally implements intensive (vs. extensive) land uses. By implementing land-saving urbanization strategy, cities at all levels shall follow the basic principles of clustering industries, centralizing distribution, and intensive land use, change the past extensive land use practices to promote intensive urban growth and development. In particular, we shall fully tap the potential of existing urban land, especially in developing policies for industrial land conservation and scientific guiding farmers for centralized living style. Ultimately, we shall be able to reasonably determine the land use scales for urbanization based on local socioeconomic development level, regional characteristics, resource endowment and environmental basis. With land-saving

urbanization, we aim at improving the output efficiency per unit land, the overall operating efficiency of the entire city, the quality of land use, and building and intensive growth city.

#### 3.1.2.3 Implementing Material-Saving Urbanization; Urbanization Quality and Level Shall Be Determined by the Amount of Reasonably Available Materials

Material-saving urbanization refers to saving various types of materials, reducing the consumption of raw materials via various tools and techniques, and ensuring recycled and sustainable use of the raw materials during the process of urbanization. It aims at improving raw material using efficiency for a material-saving city and society. In addition, material-saving does not only focus on saving raw materials (though that's still important) but also require as much as possible the use of high-tech, clean, non-polluting, energy-saving and ecologically healthy new materials. As a matter of fact, the use of clean, energy-saving, green, ecology, healthy new materials shall be used as an important measure of urbanization quality.

#### 3.1.2.4 Implementing Energy-Saving Urbanization; Urbanization Efficiency and Effectiveness Shall Be Determined by the Amount of Reasonably Available Energy

Energy-saving urbanization refers to high efficient use of energy during the process of urbanization. Saving energy (as reasonably much as possible) shall be promoted and enforced (if necessary) in any energy demanding aspects of urbanization, from urban architectural environment, city light system, safety and security control to high-speed data networks, local emergency backup generators, etc. The goals are doing everything possible to reduce energy consumption per unit production and in every possible aspect of production to continuously improve the urbanization energy consumption efficiency, and build an energy-saving society city. At the same time, we should vigorously promote the use of wind, solar, biomass, and other new energy sources, and accelerate the phasing out of traditional energy sources. The amount and quality of new energy usage shall be set as an important measure for promoting the New Urbanization so that we can use new energy to promote healthy development of New Urbanization.

### *3.1.3 Eco-Environmental Friendly Urbanization*

Eco-environmental friendly urbanization mode is based on the principles of sustainable development to rationally allocate resources, equitably respect the future

generation to meet their developmental and environmental needs. Such urbanization mode will not employ the "predatory" approach to promote a temporary prosperity. It is also not a mode that undermines regional ecological environment for its own development; instead it focuses on ensuring healthy, coordinated, and sustainable urbanization development. Eco-environmental friendly urbanization always adapts to regional ecological environment carrying capacity. Eco-environmental friendly mode of urbanization includes green eco-urbanization, sustainable urbanization, pollution reduction urbanization, and recycling-oriented urbanization.

#### 3.1.3.1 Green Eco-Urbanization

Green eco-urbanization requires that the New Urbanization in China must take the path of respecting the eco-environment. Optimizing the overall urban ecological environment is both the starting point and destination. Convenience, harmony, livability, and low-carbon are the goals. Ecological civilization and eco-environment friendliness are the mainstream. Seeking ecologicalization of urban socioeconomic development and building eco-industrial system, promoting sustainable urbanization are the primary actions. With the growing strength of China's economy, especially the overall economic development (GDP) rank in the world and citizen's income levels are continuously improving, consumption structure and consumption demands of urban residents have undergone profound changes. Comparing to the past, urban residents are now more concerned about the impact of goods and services on their environment and their own health. Environmental protection and low-carbon green economy will become top priority for future development of China's cities and towns. As per this trend, implementing the scientific concept of development of ecological urbanization with Chinese characteristics not only promotes sustainable economic and social development in China, but also promotes the healthy and sustainable development for the entire earth. It is inevitable to build a harmonious, tranquil, and ecological world.

The first aspect of green urbanization requires strict control of the total population density. Specifically, we shall first start by controlling the building density, so that the construction of the new and old city centers can be carried out in accordance with ecological standards. According to China's actual situation, the population density of urban construction zones shall be controlled between 8000 and 10,000 people per square kilometer. Population density in the urban core area should be no more than 20,000/km$^2$ [11]. Studies have shown that many of the fundamental causes of the current urban disease are that population density far exceeds the actual carrying capacity. A basic connotation of eco-cities is a reasonable population density. If the population is too densely distributed, it will inevitably lead to deterioration of its ecological environment. In China, green and eco-urbanization shall be reflected in the urban–rural integration process, be kept pace with the industrialization and modernization of agriculture, and fully embody the harmony between human and nature. Eco-urbanization promotes relying on low-carbon production and lifestyle to create a comfortable working and living

environment for urban residents. Therefore, it would be beneficial to develop as soon as possible guidelines for industrial policies to support the development of green industries, and contribute to build resource saving and environmental friendly cities.

#### 3.1.3.2 Promote Sustainable Urbanization

One of the important features of environmental friendly urbanization is its sustainability. Sustainable urbanization has multiple connotations. On one hand, sustainable urbanization requires the protection of natural environment and resource bases, maximum use of renewable resources and energy sources without endangering their renewability, maintaining biodiversity, protecting all natural resources and life support systems, and continuously improving the quality of the environment and quality of life. On the other hand, sustainable urbanization also includes sustainable economic development and sound operation of the society. For urban development, the natural environment loses its "human" essence without economic development and social harmony. In this sense, eco-friendly urbanization needs to and has to be sustainable urbanization.

Environmental friendly city must be environmentally sustainable. Urban planning must be carried out under the strict guidance of the principles of sustainable development. A sustainable city is one that achievements made at the social, economic, and physical spheres can be sustained in the long run. The natural resources it depends upon can provide lasting support, lasting safety, and avoid possible environmental hazards that threaten development results.

#### 3.1.3.3 Recycling-Oriented Urbanization

Eco-friendly urbanization requires that the development of urbanization shall comply with the principles of quantity reduction, material reusing, and recycling. By actively developing material reusing and recycling enterprises and eco-industrial parks, we intend to vigorously popularize clean production, extend the eco-industrial chain, promote green consumption, develop recycling economy, and create a recycling-based city with the whole society participating. Eco-friendly urbanization also requires changing the high-energy consumption, non-cyclic operation mechanism of the traditional cities, and improving the efficiency of all resources usage so that we can make the best use of all materials. Specifically, we shall devise strategies and employ most advanced technologies to maximally utilize materials and energy at multiple level and multiple aspects. We shall promote waste recycling practices, coordinated and symbiotic relationship among various departments and industries to build highly efficient, energy and materials recycling cities.

#### 3.1.3.4 Emission Reduction Urbanization

Emission reduction urbanization aims at developing an urban economy with high output but low emission (some industries and enterprises can even achieve "zero emissions"). Such economy is often characterized by high efficiency, recycled use of materials and energy (agrees with the eco-friendly urbanization). At the macro-level, urban development shall focus on nurturing rational industrial structure, developing resource and energy-saving production modes, so that the production and control systems are highly efficient. At the micro-level, we shall actively develop environmental friendly technologies, design and produce highly enduring and repairable products, maximally reduce potential wastes, and enlarge the scope of recycling and reusing of materials. In so doing, we shall be able to build a cleaner and emission reduction city.

### *3.1.4 Urbanization Within Local Constraints and Conditions*

China covers a vast land area, which indicates the regional conditions, resource endowments, socioeconomic development levels will be fairly different across the entire nation. This also reflects in the vast differences of urbanization at different regions. This is especially true after the reform and opening up of China's economy. Difference among urbanization at different regions became more obvious due to unbalanced economic development level. Studies suggest that widening regional inequality will not help realize China's goals of building a moderately well-off society. For that matter, during the urbanization process, it is necessary to allow different regions to have different urbanization promoting strategies. More importantly, although urbanization policies are often nation-wide, urbanization at different regions shall respect local conditions and constraints. Urbanization shall first be localized and does not have to follow prescribed patterns or paths. Instead, we shall choose the most appropriate modes for urbanization based on local resource endowments, environmental carrying capacity, and current foundations. Instead of demanding all regions follow a prescribed set of urbanization approaches, we shall encourage innovative ways to promote healthy and sustainable urbanization. In particular, it will always be helpful to give full consideration of the differences that are bound to exist in different regions, different main functional areas, different economic zones, and different types of cities. With that in mind, the differentiating modes for urbanization at different regions will be able to respect local conditions, and avoid the so-called "one size fits all," unhealthy urbanization strategies. Such a change of mindset especially at the local officials' decision-making level is the core concept of New Urbanization strategy.

#### 3.1.4.1 Promoting Urbanization that Respects Local Conditions and Constraints

From the analysis of the differences among large, medium, and small cities, we found that the scale and number of cities are often determined by complex factors such as geographical locations, natural endowments, and socioeconomic development history and foundations. According to the sixth census, super cities (population more than 10 million) emerged from scratch to 6 in 2010. Mega-cities with 5 million–10 million population increase from 2 in 1990 to 10 in 2010. Large cities with 1 million–5 million people increased from 29 (1990) to 120 (2010). Medium-sized cities with 500,000–1 million people increased from 28 (1990) to 106 (2010). Small cities with up to 500,000 increased from 408 (1990) to 415 (2010). As of when this book was writing, a hierarchical urban system with six (6) super cities, ten (10) mega-cities, 120 large cities, 106 medium-sized cities, and 415 small cities emerged in China. From a sustainable, resource and energy conserving, environmental friendly perspective, such hierarchical urban development pattern and spatial distribution pattern is reasonable. It is indeed an evolved pattern after years of interaction between human and land, economic development, industrialization, and urbanization. We might term it the result of "natural selection," and we do not expect such pattern (not the numbers of various cities, though) will be changed in the long run. Therefore, the future of urban development in China shall fully respect the current status of this hierarchical urban development patter. In the meantime, depending on the dynamics of local resources, energy endowment, and environment carrying capacity, we shall periodically adjust urbanization policies to optimize the scale structure, functional structure, and spatial structure of the urban system. The fundamental principle is that all development and further changes shall be based on local conditions, regardless of where it happens. When local conditions permit, the size of the city can go as sustainably large as possible, or as sustainably small as possible per the local endowment constraints. In a nutshell, the size and number of cities of a particular region shall be within local resources and environmental carrying capacity. Cities must develop gradually within the carrying capacity. Quality of urbanization shall dominate the process instead of engaging in any type of regional blind competition on the quantitative indicators (size, population urbanization level, urban build-up areas, etc.).

From analyzing the New Urbanization modes in the Eastern, Central, and Western China, based on the principle of urbanization based on local conditions, we propose effective New Urbanization strategies different in the three regions. In particular, in eastern regions, New Urbanization shall focus on priorities of upgrading the industrial structure, implementing comprehensive management of environmental pollution, especially cleaning up the large area of urban haze, developing efficient and intensive use of local resources, and promoting further economic development. Starting from the adjustment of the spatial structure of the urban system, the eastern region needs to improve industrial concentration and compactness of urban development in order to improve the quality of New Urbanization. Its ultimate goals are to ensure that the quality of urban development

approaches and catches up with the international standards to increase the eastern region's urbanization international competitiveness. In the central region, the New Urbanization strategies shall focus on priorities of continuing to expand the capacity of cities and towns to absorb rural population. Specifically, we need to improve the urban infrastructure in central region, and actively guide and encourage reasonable (based on the sustainable principle) expansion of large and medium-sized cities, and actively develop small cities and towns, making the central region the "main battlefield" for active New Urbanization. For the western region, implementing New Urbanization strategies must consider the strong constraints of natural environment. Urbanization shall focus on the development of both large cities and small cities and the implementation of the so-called "stronghold-type" of development, namely, choosing a few strategic locations with relatively strong resource and environment carrying capacity, and focusing on the development of these spots to become local centers and strategic growth poles. Specifically, urbanization shall constantly adjust population and economic elements in space to form the so-called ecological urbanization mode that develops under the natural constraints of the western region.

Analyzing the different scenarios of urbanization at the provincial level, we shall realize that implementing New Urbanization strategies for the four (4) provincial level municipalities (Beijing, Tianjin, Shanghai, and Chongqing) is completely different from that for the five (5) autonomous regions. The basic principles are still to respect the local conditions, but in the meantime, New Urbanization strategies shall also respect and focus on regional specific characteristics. For the 22 provinces, we must realize that they are at different stages of socioeconomic development and urbanization. Problems, issues, and difficulties in different provinces are fairly different. For this matter, the implementation of the New Urbanization strategies can learn from one other, but shall never be copied.

#### 3.1.4.2 Promoting Urbanization that Respects the Differences Among Different Development Types

From analyzing the differences of the four main function areas of New Urbanization, namely, priority development zone, key development zone, development restricted zone, and development prohibited zone, there shall be different strategies for them as well. For the priority development zones, the strategy shall focus on enhance the capability to participate in economic globalization, improve the core cities' competitiveness, accelerate the internationalization of urbanization, improve the quality of urbanization, and strengthen the roles and functions of the core cities to participate in international geographical division of labor. The goals for priority development zones are to form a compact, resource, and energy-saving and environmental friendly mode of urbanization. For the key development zone, the strategy stresses on guiding the central cities to enhance their overall function, accelerate the pace of industrial concentration and spatial reorganization, promote appropriate expansion and rate of the New Urbanization, and form a suitably

compact and resource saving urbanization development mode. For development restricted zones, the strategy shall focus on guiding the rational development of urbanization in rural areas and implement the dual strategy of simultaneous conservation and development. For the ecological and environment fragile regions, the development can take a "stronghold style." The purpose of such development style is to protect the ecological environment, in the meantime develop the local economies for an environmental friendly urbanization mode. For the development prohibited zones, however, any intensive or extensive development shall be avoided. The urbanization mode shall take an entirely ecological-oriented mode.

For agricultural, mining, pastoral, forests, parks, inner urban, suburban, tourism, ethnic autonomous areas, and poverty areas, promoting New Urbanization strategies would be very different as well. The ground rule is that the mode must respect the different characteristics of those areas. Any actions that would not respect such characteristics shall be avoided.

Analyzing the actual implementation of New Urbanization in different regions suggest that there shall be no uniform mode of New Urbanization. Instead, New Urbanization is but a strategy that abides by the difference in local conditions, characteristics, and time period. The most appropriate mode is often unique to the specific region, even specific city and town. For instance, Chifeng City, Inner Mongolia Autonomous Region, is a typical farming– pastoral region. Comparing to the eastern coastal areas, it is sparsely populated. The farmers and herdsmen live in fairly scattered places. Sending the children to school, seeking for medical treatment, and daily shopping mainly occur in the central town. To this end, the New Urbanization strategy for Chifeng city should focus on expanding the central town of Chifeng, to be a 100,000–200,000 central place to attract more resources and production factors and to improve its diffusive capability around the area. Based on local conditions, we could also promote the construction of a number of distinctive key small towns, so that the related industries, facilities, basic public services can also be extended to these small towns. While in the meantime, we can extend the industrial, facilities, and services to agricultural and pastoral areas to promote the establishment of an integrated urban and rural urbanization structure.

#### 3.1.4.3 Promoting Urbanization that Respects the Difference in Different Time Periods

Urbanization stages at different places have different economic development and urbanization stages. During the process of creating strategies for New Urbanization and implementing them, we must develop appropriate strategies according to their different stages with development goals. It would be inappropriate to pursue a single goal and development objective for all cities at all time. Moreover, it will be detrimental to engage into blind competition and create improper or even impossible goals for the time being for urbanization.

### *3.1.5 Urbanization Without Sacrificing Rural Development*

For this development mode, it requires urbanization shall be embedded with the new rural construction. Using the land as the carrier to enable farmers to participate and share the progress of urbanization. In the process, farmers shall be the main force for promoting the urbanization in China. The goals of New Urbanization goal are not simply to improve the urbanization level, but to integrate urban and rural areas. This is especially true in rural and pastoral areas, urbanization shall be a primary means to promote the progress of new rural construction so that every village has road access, water, electricity, postal services, radio and television, network; children have the opportunity to go to school; residents have access to doctors, leisure, exercise, pension, and so on, and farmers and herdsmen can enjoy the same benefits as urban citizens. In a nutshell, this integrated urban and rural development mode for harmonious urbanization includes the following six basic connotations.

#### 3.1.5.1 Urbanization Closely Integrated with New Rural Construction

Prosperous new rural construction is the basis for healthy urbanization. For this matter, it is necessary to highlight the priority of enriching the people when promoting New Urbanization. To do so, we must gradually shift from the past emphasis on urban development to coordinated development of urban and rural areas. We must put efforts to vastly improve the living conditions and quality of rural residents during urbanization, greatly devise and implement efficient plans for rural development, actively and steadily promote concentrated patterns for farmers' residence based on local conditions, actively strengthen the rural environment protection, and improve the rural landscape. In this process, the governments shall focus on supporting the development of rural public utilities, integration of urban and rural infrastructure development, and vigorously promote the extension of urban civilization to the countryside so that rural residents can fully enjoy the achievement of urban civilization. In the meantime, policies shall be devised and implemented to enable rural migrants to become real urban dwellers (instead of just "migrant workers"). The ultimate goals are to enable urbanization as an effective means to facilitate the transfer of rural surplus labor so that urbanization will benefit rural development, and the rural and urban regions can develop simultaneously.

#### 3.1.5.2 Coordinated Development Among Large, Medium and Small Sized Cities

In the Third Plenary Session of the CPC's Eighteenth Congress Assembly, it was made very clear that we need to promote institutional mechanisms for healthy urbanization with Chinese characteristics, promote people-centered urbanization,

promote coordinated development among large, medium, and small cities and small towns, promote integrated development of industries and cities, and promote integrated development of urbanization and new rural construction. Optimizing the urban spatial structure and management structure and enhancing the city's comprehensive carrying capacity are the top priorities for China's New Urbanization. One of the important measures for healthy urbanization is whether urbanization is able to facilitate joint coordinated development among different sizes of cities and towns in the region. During unhealthy urbanization, large cities often develop at the expense of medium cities' development, while medium cities develop at the expense of small cities, and small cities develop at the expense of small towns and so on and so forth. To avoid such hierarchical deprivation of development, we must actively guide reasonable and orderly transfer of the rural surplus labor force and ecological migrants, concentrate on the expansion and upgrading of existing medium and small cities, focus on supporting the development of selective county - level cities with relatively strong regional conditions, economic development level, and favorable ecological environment, based on the regional population distribution and ecological environment conditions. We shall also improve the efficiency of water and land resources, reduce ecological damage and the scope of environmental pollution that may occur due to human activity, and achieve harmony between man and nature for coordinated and orderly development of all sizes of cities and towns.

#### 3.1.5.3 Coordinated Development of Urban and Rural Areas

The coordinated development of urban and rural areas requires coordination among regions, region and cities, and cities and rural areas. The goals are to promote unified planning, coordination, construction, layout, and management in terms of regional industrial layout, major infrastructure construction, and ecological environment protection. In so doing, we shall be able to create an integrated urbanization community that will promote regional urbanization level and quality, and then continue to improve the overall competitiveness of the cities in the region, enhance their resilience in the globalization era. At the end of the day, we shall be able to gradually create healthy urbanization development pattern based on different requirements of the four main function areas, namely, key development, priority development, restricted development, and prohibited development zones.

#### 3.1.5.4 Coordinated Development Between Urbanization and Rural Socioeconomic Development and Ecological Environment Protection

There are three standards for integrated urban and rural development, namely, whether the speed of urbanization coordinates with comprehensive economic, social, and other growth factors; whether the urban and rural spatial development has continuing global competitiveness; and whether urbanization can promote

ecological environment construction and rational use of resources. Thus, integrated urban and rural development refers to coordinated development between economic development and urbanization, coordination between the economy and society and environment and resources, and a combination of improved living environment and quality of life for all residents.

#### 3.1.5.5 Coordination Between Market and Government Regulation

For successful integration of urban and rural areas, on the one hand we must rely on the invisible hand of the market, and follow the law of market principles. On the other hand, we shall also fully employ the visible hand of the regulatory mechanism of the government. While using together, the "two hands" shall be able to form a complex regulatory mode that combines the market principles and government regulations. In so doing, we are able to ensure that urbanization has a scientific and reasonable speed, scale, volume, and rhythm. We will also have better chances to avoid excessive urbanization due to market failure, or restricted urbanization due to too much control from the government.

### *3.1.6 Comprehensive and Open Driven Urbanization*

The overall guidance of economic development and New Urbanization proposed in the Third Plenary Session of the CPC's Eighteenth Report includes building the new open economy system to adapt to economic globalization; pushing forward the mutual promotion of opening both the domestic and international markets; creating better integration of bringing in and selling out products and resources; promoting orderly and free flow of international and domestic factors, efficient allocation of resources, and in-depth market integration; accelerating the development of new competitive advantages and participation in international economic cooperation; promoting further reform; insisting on bilateral, multilateral, regional, and sub-regional open cooperation; expanding common interests with all countries and regions; accelerating the implementation of the peripheral-based free trade association (FTA) strategies; and encouraging expanding opening up along the inland border regions. In addition, the report emphasizes that China's economic development in the global era and the implementation of New Urbanization strategies shall seize the opportunity of global industrial relocation to push coordinated development among inland trade, investment, and technological innovation. By innovating processing trade mode, we shall be able to promote the development of institutional mechanisms for inland industrial clusters development. In addition, via supporting the inland city to open international passenger and freight routes, we will be able to develop intermodal transportation system, and form the opening up economic corridor that links across the east, central, and west and connects the north and south regions in China. Via implementing specific policies that allow

more convenient personnel exchanges, processing and logistics, and tourism along the key border crossings, border cities, and economic cooperation zones, we shall be able to accelerate the pace of opening up along the inland borders. Furthermore, through the establishment of developing finance institutions, we shall accelerate infrastructure construction that will enable more convenient and efficient interoperability with the surrounding regions and countries. We also need to further promote the Silk Road Economic Belt, the Maritime Silk Road construction to form a new pattern of all-round opening (*Decisions on Several Issues regarding Comprehensive Deepening Reform by the CPC*, passed by in the Third Plenary Session of the Eighteenth Central Committee Report, November, 12, 2013). This new system that complies with an open economy and all-round opening up strategy in the economic globalization era has brought unprecedented opportunities for the development and dynamic allocation of global resources to promote China's New Urbanization.

#### 3.1.6.1 Allocate Resources in a Global Era to Accelerate the National Industrialization and Urbanization Process

It will be a critical period of accelerated development of urbanization and industrialization in China over the next decade. The demands for energy and mineral resources will continue to reach the peak. Necessary mineral, energy, food, and other strategic resources needed for national development will become increasingly scarce. To accommodate such dilemma between increasing demand and decreasing supply, we need to plan from a high-end perspective for the global allocation of resources, the establishment of a secure channel of necessary resources, and expansion of the overseas channels through loans for resources to secure the needed national energy, mineral, and agricultural resources. We need to implement the so-called "seeking-out" strategy, build economic and trade cooperation platforms through high-level institution-led organizational and enterprise projects to seek profitable business opportunities. The cooperation platforms shall serve as a channel to avoid disorderly competition of domestic enterprises overseas to ensure overall profitability among all oversea enterprises. We shall take advantage of globalization to facilitate the accelerated development of urbanization and industrialization, promote the concept of scientific development plan to actively create new advantages in international competition, and grasp the initiative in the development of a new world pattern.

From the strategic need of New Urbanization, industrialization, and modernization, and the survival of 1.3 billion population, also considering the strategic needs of developing international market, China will build a strategic framework for New Urbanization development mode that closely focuses on the core national interests, and firmly grasp and use the strategic path of "China's development needs → global resource allocation → key countries (regions) resource planning → systematic planning for key international projects → organizing enterprises to seek out and implement" (Figure 3.1). The key of such strategic path is to serve

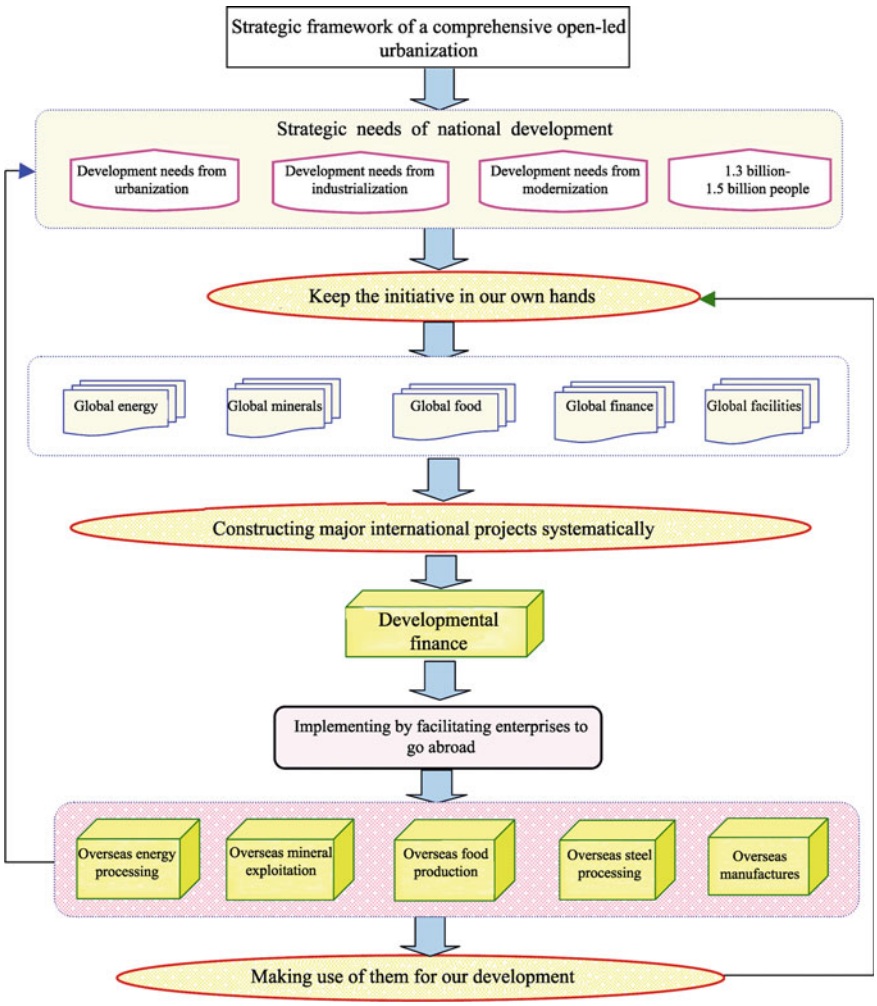


**Fig. 3.1** Schematic diagram of implementation path of the comprehensive open-led urbanization model

China's core national resources interest, and plan for international cooperation in mining, railways, ports, power infrastructure and agriculture, livelihood, and other social areas from all segments of the industrial chain. Through the development of financing, systematically planning for major international projects, organizing enterprises to go overseas and put such strategies into practice, we shall be able to obtain sufficient foreign mineral resources, food, energy, iron and steel, and other raw materials. Moreover, we shall support offshore processing of products and other resources to both serve national economic diplomatic strategy and create more international space for the development of New Urbanization.

#### 3.1.6.2 Constructing the Silk Road Economic Belt to Promote the New Urbanization Process Along the Belt

The Silk Road Economic Belt connects to the east of Asia-Pacific economic zone, and to the west of the European economic zone. It is the world's longest, most promising economic corridors. Construction the New Silk Road Economic Belt is a major strategic initiative of the State Council toward fully opening up to the global economy. Needless to say, it will have crucial influence on China and the world's economy. During the process of establishing the Silk Road Economic Belt, there are seven relationships that need to be properly managed for its success, namely, relationships of the "old" and "new" Silk Road, "economy" and "politics," "international" and "domestic," "national top-level design" and "local efforts," "me-centered" and "serving me," "soft road" and "hard road," and "multilateral" and "bilateral."

1. Properly manage the relationship between the "old" and "new" road, but focus on the spatial extent of the old road. The so-called "old" Silk Road Economic Belt starts east from Chang'an (now Xi'an), passing through Shaanxi, Gansu, Ningxia, Xinjiang, Central Asia, West Asia, and the Mediterranean countries. It was the major land path for joining the commercial trade and cultural exchanges between the East and the West, and was also known as the Northwest Silk Road. The "old" road is generally divided into eastern, central, and west sections. The eastern section starts from Chang'an to Yumen Pass and Yang Guan. The central section starts from the west of Yumen Pass, Yang Guan to Congling. The western section starts from the west of Congling and passes through Central Asia, West Asia, and all the way to Europe. The three sections were further divided into the north, central, and southern lines. Since ancient times, the "old" road was regarded as an extremely important connection of economic and cultural exchanges between Asia and Europe. Its importance was well recognized by the joining nations throughout the history. On the other hand, many current studies often proposed the "new" Silk Road Economic Belt that extends further southward all the way into the Bangladesh, China, India, and Myanmar (BCIM) regions, attempting to include most of the countries in Eurasia and most provinces in China. At the surface value, this type of "expansion" seems to promote a fully open economic system, but in reality such expansion was on the one hand not recognized by the world, on the other hand would have complicated the already complex issues of the involving nations. It is therefore recommended to properly handle the inheritance and convergence relations between the "old" and "new" belt. As of now, the main spatial extent shall focus on the "old" belt, which will be more likely to be accepted in the world and neighboring countries.
2. The relationships between "economy" and "politics," focusing on economic cooperation The Silk Road Economic Belt has always been the primary corridor of economic and trade cooperation and cultural exchanges. It also played an

important bridge and link role in coordinating and balancing neighboring countries. Under the new international political and economic environment, we will expect it to continue to play this role. But first and foremost, we need to seek complementary and mutually beneficial economic and trade cooperation opportunities with neighboring countries. We need to further exploit economic spaces within this international economic belt for equal development, mutual supplementation and benefit, mutual cooperation, and common development. Specifically, these include collaboratively building industrial parks, establishing economic and trade cooperation platforms and opening up experimental zones, and building energy and mineral bases, and collaboratively develop infrastructure. Through implementing practical cooperation projects, we intend to initiate bilateral or multilateral economic and trade development. It is only through mutual economic trades, mutual communication channels, and interactive exchange of cultures that we will gradually win the trust in politics. Such mutual trust will then serve as the basis for the geopolitical coordination and balance of the surrounding countries and the formation of new international relations. Only then, China will be able to establish its international role, and win over the initiative and right to speak. Therefore, for the successful construction of the Silk Road Economic Belt, it is imperative to seek multilateral cooperation and win–win strategies. We must first focus on economic and trade cooperation and highlight key areas of economic and trade cooperation and cultural cooperation. In the meantime, we shall dilute political considerations, and dispel the neighboring countries' wariness to avoid unnecessary suspicion and distrust. Only in this way can the Silk Road Economic Belt be "good-neighborly friendship belt" and "strategic stability zone."

3. Relationship between "international" and "domestic" segments, focusing on the "domestic" segment. The Silk Road Economic Belt is an international economic zone across Asia and Europe and contains a large number of countries with various forms of government. Such a region inherently has complex geopolitical relations with salient ethnic and religious issues, different social systems, and various economic and social development foundations. Suppose we focus on the international segment of the Silk Road, it will be difficult to revive the Silk Road and to initiate successful cooperation over the international segment and to achieve the win–win development goals, let alone embed the development of Silk Road into the National Economic Strategy. For these reasons, in the process of reinvigorating the Silk Road Economic Belt, we need to adhere to the principles of being united with mutual trust, being equal, being tolerant yet learning from one another, dealing with nearer and easier issues first and farther and harder issues later, working toward simultaneous development and security to achieve mutual benefit and win–win. Such strategies requires us to fully respect different civilizations, social systems, development mode selection, political systems, cultural traditions, economic, diplomatic, legal system, and other aspects of neighboring countries. Our actions will be based on fully developing the "domestic segment" of the Silk Road, but linking through and

exploring to the maximum extent the "international segment." We shall focus on building the domestic segments of the Silk Road, including the four core urban agglomerations, namely Chengdu-Chongqing, Guanzhong, Lanzhou-Baiyin-Xining, and Northern Tianshan Mountains. In the meantime, we need to strengthen the development of core nodal cities, such as Xi'an, Lanzhou, Urumqi, Dunhuang, and Jiayuguan. By gradually promoting their central city functions and radiating capability, we attempt to form a so-called hub-and-spoke driving effect, so that we are able to graft the influence of the domestic segment's economic, trade, and cultural cooperation onto international segment, and eventually form an economic corridors and hallways of friendship and cooperation of interactive international and domestic development and cooperation.

4. Relationship of "national top-level design" and "local efforts to promote," primarily based on "national top-level design." Reinvigorating the Silk Road Economic Belt is China's grandeur strategy with international factors. It is, however, first and foremost an act of state, then an act of the local participants. For this matter, we need to form all the strategies from the strategic standpoint of integrating the national economy into the world economic and political system. The first step is to generate the "national top-level design," with a clear picture of how the Silk Road reinvigoration shall be embedded into the roadmap of national strategic consideration, and clear strategic positioning, direction, priorities, and action plans. Based on this top-level design, we shall then be able to propose appropriate strategic development plans for the provincial units along the Silk Road. Such a rational and nationally beneficial strategy, however, was not practically followed by the local governments. In fact, oftentimes, the local participants have made the first move before the "national top-level design" was even completed without coordinated consideration. In so doing, the local participants often present action plans that are competing for leading positions, policies, and projects to build them as the "bridgehead," "golden segment," "vanguard," "new starting point," or "core area" of the proposed New Silk Road Economic Belt. Such action plans often serve more toward attempting to solve local issues and benefit narrowly their own interests instead of addressing national and international coordination and development. Although the quick responses to such opportunities by the local governments are to be applauded, the real problem for such local-oriented action plans is that they often focus on individual issues without comprehensive and overall consideration of the national and international interests. Such action plans usually are unable to balance between national strategies and local interests, unable to address balanced division of labor among local participants and complementary development. The fact is that any local governments are unable to solve the various problems that are bound to rise during the development and reinvigoration of the New Silk Road Economic Belt. These issues need to be resolved from the national level and coordinated interaction. It is therefore recommended that the

"national top-level design" shall always prevail over the "local efforts" to avoid local short-sighted behaviors.

5. Relationship between "me-centered" and "serving me," "serving me" shall be the primary goal. The primary purposes of reinvigorating the Silk Road Economic Belt are to take the initiative with the intention of developing joint cooperation between countries in the region along the Silk Road. An important strategy is to form a cooperation mechanism of "developing the domestic economy with the support of international resources, promoting the international development with domestic development, and coordinating domestic and international integration for joint development." Such strategies often will be able to maximize the advantages of participating countries' resources, geographic locations, markets, and technologies for unprecedented development that was not possible for any individual participants. The strategies will be based on the construction of international transportation channels to promote complementary development of various industries, encourage resources sharing, allocate global resources more efficiently, and develop the international market. Through the sharing of resources and exploiting complementary advantages, we aim at building the Silk Road Economic Belt to import energy, mineral resources, food, and steel from relevant participating countries. In so doing, we will be able to meet national needs for New Urbanization, new industrialization, and national modernization. In the meantime, we shall also benefit the participating countries with exporting industrial products, consumer goods, and high-tech products to meet the needs of these countries. Through domestic and international mutual trade cooperation and expanded trade volume between China and neighboring countries, we intend to form a virtuous new international economic order, and improve China's economic status and international influence in the Eurasian region. For this consideration, it is vital to correctly deal with the relationship between "me-centered" and "serving me" in the process of reinvigorating the Silk Road Economic Belt. The core is "serving me." We shall not develop bilateral or multilateral relationships with neighboring countries through international aid or poverty reduction initiatives. The driving force shall be to devise appropriate institutional mechanisms to deepen the domestic participants' cooperation with international partners along the Silk Road Economic Belt. We aim at developing and opening new platforms and new models of international economic cooperation. In the process, we shall encourage various explorations for better cooperation modes that benefit all participating parties. In so doing, we will be able to further evolve the international interaction channels that link the Central Asia and West Asia to promote international cooperation and develop and the hinterland's economy.
6. Relationship between the "soft road" and "hard road," focusing on "soft road." The first and foremost priority for the Silk Road Economic Belt is the "road." However, the status quo of the Silk Road is that the physical "road" is already there, but the "soft road," namely, cultural exchange, science, technology, education and training exchange, barrier-free travel, electronic logistics, national

think tanks and media exchanges and cooperation, convenient customs clearance, convenient investment and trade, and other humanities channels, remains fairly blocked. Apparently, by improving and removing blocks of these "soft roads," initiating smooth dialogues and mutual learning among different civilizations, we will be able to consolidate public opinion, provide public support, and strengthen awareness of common strategic interests. A smooth and barrier-free "soft road" will certainly lay solid foundation for the physical "hard road" of the Silk Road Economic Belt. As long as the "soft roads" opened up, the "hard roads," including expressways, railways, pipelines, aviation, and other transportation channels, electricity, telecommunications, trade, logistics, and the like will proceed smoothly. Through collaborative and interoperable construction of both the "soft" and "hard" roads, reinvigorating the Silk Road will drive along China's industrial structure upgrading and industrial restructuring, promote smooth transition of the nations that are currently experiencing economic transition. Only then, the Silk Road Economic Belt will be able to integrate the economies of all the participating nations to form an international economic cooperation corridor of great development and regional cooperation.

7. Relationship between "multilateral" and "bilateral," focusing on "bilateral." The international political economic and geopolitical patterns surrounding the Silk Road Economic Belt are fairly complex. Reinvigorating the Silk Road needs to take that into consideration. The general principle shall be "multilateral cooperation, breakthrough via bilateral cooperation, strengthening a growth pole for areal development, and connecting multiple regions through the Road." Developing international relationships shall be flexible. Choosing either multilateral or bilateral cooperation shall be determined by which mode brings the maximum benefits to all participants. It is crucial to properly handle the multilateral and bilateral relationship with both large and small nations in the region. Above all, "bilateral" economic and trade cooperation and humanity and cultural exchange shall be the priority for coordinated mutual development among nations during the process of reinvigorating the Silk Road. On the other hand, the multilateral cooperation shall be set as the goal for the long run. In principle, development of "bilateral" cooperation shall promote future "multilateral" cooperation. In the meantime, developed "multilateral" cooperation will also provide foundation for stable "bilateral" relationships. For this consideration, "bilateral" cooperation will then be the first priority in the short term. In the middle and long term, through establishing cooperative forums, national cooperative organizations and mechanisms along the Silk Road Economic Belt, the development will focus more on "multilateral" cooperation. The ultimate goal is to build the Silk Road Economic Belt to be a flexible and pragmatic carrier for both bilateral and multilateral cooperative projects. This is a new, but pragmatic practice for China to maintain its national security, stabilize its society, develop its economy, demonstrate its openness in international exchanges, and promote equality and democracy in international relationships.

#### 3.1.6.3 Establishing the Yangtze River Economic Belt as the New Growth Belt for China's Economic Growth, and Promoting Urbanization via Two-Way Pulling Open Process

Along the trajectory of China's economic development after the reform in 1978, there was always a growth center. In the 1980s, it was Shenzhen, Guangdong. In the 1990s, it was Pudong, Shanghai. In the beginning of this century, it was the Binhai area, Tianjin. In the future, the Yangtze River Economic Belt will be performing this leading role. In July 21, 2013, when China's President Xi Jinping visited Hubei Province, he specifically pointed out that we needed to "strengthen cooperation along the Yangtze River watershed and fully exploit the inland river transportation to create a golden water channel on the Yangtze River watershed." On September 21, the same year, Premier Li Keqiang in his reply to the National Development and Reform Commission (NDRC)'s report indicated that "development shall take precedence along the coast regions and (Yangtze) River, then gradually diffuse to the inland areas. This is an important law of regional economic development. All relevant departments and participants shall pay close attention to such law, conduct in-depth investigation and studies to generate guidance, create China's new economic growth belt based on the golden waterway of Yangtze River, to promote development of the regions in the middle and upstream of Yangtze River, and encourage the Central and Western China to orderly take the industrial transfer from the coastal regions." Such mindset of the new highest leaders of China fully manifests China's economic growth spatial pattern, namely, the coastal regions is like a fully drawn bow, the vast Central and Western China are the string, and Yangtze River is the arrow on this drawn bow. Now it is the time for this fully drawn bow to release at its full extent the arrow.

1. The latest spatial extent of the Yangtze River Economic Belt. On September 23, 2013, the National Development and Reform Commission in conjunction with the Ministry of Transport held a conference in Beijing on "Guidance of Relying on the Construction of Yangtze River to build the new economic growth belt in China." In the conference, Xu Shaoshi, the director of the National Development and Reform Commission pointed out that the most important task to maintain sustainable and stable economic growth in China is to be able to support the upgrade and expansion of the Yangtze River Economic Belt. On April 28, 2014, Chinese Premier Li Keqiang hosted a regional economic development forum in Chongqing. The forum included governors and mayors from 11 provinces and cities along the Yangtze River. During the forum, Premier Li pointed out that we shall rely on the golden waterway of the Yangtze Economic Zone to support sustainable economic development in China. This indicates that the Yangtze River Economic Belt has been officially embedded into the level of national strategies. Meanwhile, the National Development and Reform Commission has officially identified the latest spatial extent of the Yangtze River Economic Belt, which extends east to Shanghai and west to

Yunnan, covering Shanghai, Jiangsu, Zhejiang, Anhui, Jiangxi, Hubei, Hunan, Chongqing, Sichuan, Yunnan, and Guizhou.

2. Major strategic significance of the Yangtze River Economic Belt:

   (a) Yangtze River Economic Belt is the primary carrier for China's "pushing inwards" national development strategy. The most important channel that can carry out the task for moving China's strategic focuses from developing the coastal regions to developing the River regions, from coastal areas to inland areas is the golden Yangtze River waterway, which is now ripe in conditions, sound in economic foundation, and strong in industrial development. Recalling the success when Pudong, Shanghai severed as the pioneer for coastal opening up and development, we are confident that the development of Yangtze River Economic Belt will enable orderly and healthy transfer of coastal regions' manufacturing sectors to the inland areas. This is so not only because of the fully linked geographic location of Yangtze River, but also because of Yangtze River serving as a convenient transportation channel for developing manufacturing industries. This is the first time after 30 years with the national implementation of the coastal opening up strategy that China decided to push inwards and built an economic belt. Its strategic significance is far-reaching.

   (b) Yangtze River Economic Belt will be the new supporting belt for China's economic transformation and upgrading. For sustainable and stable economic growth in China, we shall focus on developing the domestic markets and economies. The first priority at the present is to strengthen the Yangtze River Economic Belt so that it can support such transition and upgrading in the near future. In 2012, the Yangtze River Economic Belt covers an area of 2.057 million square kilometers, accounting for 21.27 % of the country's total land area. Its population was 579 million people, accounting for 42.72 % of the country the total. Its GDP amounted to 235.9 trillion RMB Yuan, accounting for 45.46 % of the country's total. The added value for the first industry was 21.5 trillion RMB Yuan, accounting for 41.15 % of the country's total (Table 3.1). The added value for the secondary industry was 115.7 trillion RMB Yuan, accounting for 49.22 % of the country's total. The added value for the tertiary industry was 98.6 trillion RMB Yuan, accounting for 42.62 % of the country's total. Fixed asset investment was 149.2 trillion RMB Yuan accounting for 39.83 % of the country's total. The total retail sales of social consumer goods was 85.4 trillion RMB Yuan, accounting for 40.62 % of the country's total. The level of urbanization was 51.69 %, lower than the national average for about 1 % over the same period. These numbers indicate that the Yangtze River is apparently the most vigorous economic belt after the coastal regions. In-depth development and opening up of the Yangtze River Economic Belt would provide efficient solutions for imbalanced and uncoordinated development within the region, and industrial upgrading issues. It is also

**Table 3.1** Statistics of the Yangtze River Economic Belt in 2012 and its strategic position in China

| Provincial units | Area/Square km | Population/10,000 | GDP/100 million RMB Yuan | Added value of the primary industry/100 million RMB Yuan | Added value of the secondary Industry/100 million RMB Yuan | Added value of the tertiary industry/100 million RMB Yuan | Fixed asset investment/100 million RMB Yuan | The total retail sales of social consumer goods/100 million RMB Yuan | Urbanization level/% |
|---|---|---|---|---|---|---|---|---|---|
| Shanghai | 6341 | 2380 | 20,182 | 127.8 | 7854.8 | 12,199.2 | 5117.6 | 7412.3 | 89.33 |
| Jiangsu | 102,658 | 7920 | 54,058 | 3418.3 | 27,122 | 23518 | 30,854.2 | 18,331.3 | 63.01 |
| Zhejiang | 101,800 | 5477 | 34,665 | 1667.9 | 17,316.3 | 15,681.1 | 17,649.4 | 13,588.3 | 63.20 |
| Anhui | 139,427 | 5988 | 17,212 | 2178.7 | 9404.8 | 5628.5 | 15,425.8 | 5736.6 | 46.49 |
| Hubei | 187,400 | 5779 | 22,251 | 2848.8 | 11,193.1 | 8208.6 | 15,578.3 | 9562.5 | 53.50 |
| Hunan | 211,829 | 6639 | 22,154 | 3004.2 | 10,506.4 | 8643.6 | 14,523.2 | 7921.9 | 46.65 |
| Jiangxi | 166,900 | 4504 | 12,949 | 1520.2 | 6942.6 | 4486.1 | 10,774.2 | 4027.2 | 47.51 |
| Sichuan | 488,000 | 8076 | 23,873 | 3297.2 | 12,333.3 | 8242.3 | 17,040 | 9268.6 | 43.54 |
| Chongqing | 82,400 | 2945 | 11,410 | 940.01 | 5975.2 | 4494.4 | 8736.2 | 4033.7 | 56.98 |
| Yunnan | 394,000 | 4659 | 10,309 | 1654.6 | 4419.2 | 4235.7 | 7831.1 | 3511.6 | 39.30 |
| Guizhou | 176,200 | 3484 | 6852 | 891.9 | 2677.5 | 3282.8 | 5717.8 | 2027.6 | 36.41 |
| Total of the Yangtze River Economic Belt | 2,056,955 | 57,851 | 235,915 | 21,549.61 | 115,745.2 | 98,620.3 | 149,247.8 | 85,421.6 | 51.65 |
| National total | 9,672,018 | 135,404 | 518,942.1 | 52,373.6 | 235,162 | 231,406.5 | 374,694.7 | 210,307 | 52.57 |
| Yangtze River Economic Belt's percentage in national total | 21.27 | 42.72 | 45.46 | 41.15 | 49.22 | 42.62 | 39.83 | 40.62 | |

critical for fully unleashing the regional core competitiveness, building up the Central China and promoting the grand development of Western China.

(c) The Yangtze River Economic Belt is the backbone for China's comprehensive rejuvenation. Yangtze River Economic Belt will be able to drive the socioeconomic development in all three regions (eastern, central, and western) in China. The Qinghai-Tibet Plateau is often known as the "roof of the world." The Yangtze River Economic Belt can potentially be regarded as the "China's economic roof." The Yangtze River Economic Belt is expected to truly become "the backbone of China's economy." Yangtze River Economic Belt has the country's most vast hinterland and development space. It is undoubtedly the area with greatest growth potential in the future. It will and shall also be developed to become the world's largest and most widely influential inland river economic zone and the intensive industrial zone.

(d) The Yangtze River Economic Belt is the strategic channel to clear the main artery of the golden waterway. "The Collaborative Promoting Agreement of Several Key Issues to Develop Yangtze River's Water Transportation" signed by the Ministry of Transportation, local governments of the seven Provinces and two Provincial Municipals along the Yangtze River, the State Council, the National Development and Reform Commission, Ministry of Finance, Ministry of Water Resources, and the State Council of Three Gorges Project Construction made it very clear to initiate the waterway improvement project on the Jingjiang segment of the middle reach of Yangtze River. This initiative is imperative to accelerate the construction of Yangtze River golden waterway, and nurture new growth poles along the Yangtze River watershed. Specifically, we shall focus on promoting all types of transportation modes along the Yangtze River to connect seamlessly, optimizing the investment structure, and promoting the three urban agglomerations along Yangtze River Economic Belt. Moreover, we also suggest extending Shanghai FTA policy to the upper reaches of the Yangtze River Economic Belt.

(e) The Yangtze River Economic Belt is a strategic growth pole with joint coordinated development among all three regions in China. One of the primary intentions to establish the Yangtze River Economic Belt is to develop and open up the Yangtze River basin, actively respond to new changes in energy resources distribution, investment and trade patterns, and global governance structure, effectively solve uncoordinated, unbalanced, and unsustainable development problems in economic growth, promote the transfer of China's opening up from the coast to inland regions, and narrow the development gap. Different from strategies implemented in the coastal, borderline, and western regions, the Yangtze River Economic Belt has a very comprehensive nature. The Yangtze River Economic Belt is located in almost the geographic center of China. It flows through east–west, connects the north and south, links various rivers and the ocean. The Belt is rich in resources and economically developed. From

an objective perspective, we can see that the Belt not only has the material basis to narrow the gap between the East and West China, but also has the regional characteristics of connecting both ends (East and West China) with one smooth channel. Such advantages enable the Yangtze River Economic Belt to the best "strategic pole band" to promote the joint economic development and overall revitalization of the East and the West China. By contrast, the coastal strategy focuses on allowing a part of the nation to be rich first then diffuse to the rest of the country. Since the importing from and exporting to overseas strategic goal and two fan-like diffusive effects are difficult to achieve in the short term, coupled with vast spatial span in China and the large structural barrier of the dual structure, we conclude that such strategy would only produce relative short-distance effect benefiting adjacent areas in a fairly long time. It will be very difficult for such strategy to exert any long-distance diffusion effects. The borderline strategy is also fairly less significant to the national economic development and urbanization due to the weak economic base, poor traffic conditions, and fairly complex geopolitical conditions (comparing to the East) in the West China. Apparently, if the borderline strategy was treated as the national priority, we will not only pay a huge financial cost which has direct impact on the coastal and national economic development, but also will cause the border regions to develop faster than the inland regions and cause potential economic abnormality that might lead to aggravated imbalance of economic development in China. The Yangtze River Economic Belt strategy, on the other hand is able to drive the development of the East, Central, and Western China all at the same time. In the meantime, its development can also be parallel and complementary with the "New Silk Road Economic Belt" (Eurasian Continental Bridge), and the coastal Bohai Bay, the Yangtze River Delta, and Pearl River Delta economic zones to form a "T" shaped linkage.

3. Goals and priorities for the Yangtze River Economic Belt. We will upgrade and reconstruct the Yangtze River Economic Belt from six aspects, namely, integrated transportation, industrial restructuring, New Urbanization, opening up, ecological corridor, and institutional mechanism innovation. The ultimate goals are to eventually expand China's economic development to create new support for upgrading industrial structures and implementing the New Urbanization strategy:

   (a) The goals of building the Yangtze River Economic Belt are to relying on the Yangtze River Delta region, the middle reaches of the Yangtze River and three urban agglomerations in Chengdu–Chongqing (Chengyu region), effectively promote the three shipping centers in Shanghai, Wuhan, and Chongqing, accelerate hinterland development, promote opening up in both Shanghai and Yunnan, and expand the most important space to grow in China for the near future.

(b) The priorities of the Yangtze River Economic Belt shall focus on strengthening the development and integrating the three national level urban agglomerations in the Yangtze River Delta, the middle reaches of the Yangtze River and Chengdu–Chongqing regions to support national economic growth. The shipping centers in Shanghai, Wuhan, and Chongqing will play critical roles to enable the three cities to become national central cities. In the meantime, we need to promote hinterland development in the middle and up reaches of Yangtze River, accelerate the construction of the experimental area of free trade along the river, use the Yangtze River waterway to create an integrated transport system, and integrate resources along the river for development. Priority shall also be put on promoting the so-called "two-end" development and opening up, namely, the East-end opening up leading by Shanghai toward the Asia-Pacific economic zone, and the West-end opening up focusing on the southwest economic corridor including China to Pakistan, India, and Burma.

## 3.2 Differentiating Mode for China's New Urbanization

In China, conditions and foundations for urbanization at various regions are fairly different. This dictates that promoting urbanization in various regions in China shall respect local conditions and foundations. The "one-size-fit-all" strategy shall be avoided when implementing China's New Urbanization policies. Depending on different types of regions, and even different districts with different characteristics within one region, the modes of urbanization and the purposes for urbanization are different. For instance, in highly urbanized areas, urbanization can happen "on the spot." This is a so-called urbanization over the whole area mode, indicating that these types of regions often are highly urbanized, with mature urban infrastructure, public service facilities, sufficient housing, complete social security systems, highly developed economy, and strong resources and environment carrying capacity base. Non-citizens can be accepted into the urban system without causing any negative urban problems (urban diseases) instead increasing the cities' labor force. Such urbanization on the spot, over the whole area mode is hence a win–win process that supports sustainable and healthy urbanization. Other types of areas, such as the mining areas, suburban areas, pastoral areas, agricultural areas, park-like areas, field areas, tourism areas, ethnic autonomous areas, poverty areas, etc., will have vastly different urbanization mode that the highly urbanized areas. In principle, the New Urbanization stresses urbanization within local conditions. Different urbanization modes can learn from one another, but shall never copycat, instead diversified and differentiating urbanization modes are the norm of New Urbanization strategy.

### 3.2.1 *"Endogenous Circulating" Mode for New Urbanization in Agricultural Regions*

Agricultural areas refer to places whose terrains are dominated by the plains, whose economy is dominated by farming, and whose population is mainly farmers. These areas often are underdeveloped or undeveloped. In the meantime, these regions are also China's major grain producing areas. They play extremely important roles to enhance the country's total grain output and ensure national food security [12]. Due to these areas' importance in supporting national food security, urbanization in the agricultural areas must first ensure that it will non endanger the nation's food security, and then we shall actively promote urbanization.

#### 3.2.1.1 Implementing New Urbanization in Agricultural Areas Must Give Priority to Ensure National Food Security

The primary characteristics and also the main problem when implementing New Urbanization policies in the agricultural areas are that these areas shoulder the historic mission to ensure national food security. Protecting the arable land has very rigid constraints and converting arable land for urban use is often nearly impossible and non-negotiable. This means the spaces for urbanization are the primary constraints. Large-scale industrialization and urbanization must be limited due to national strategies and relevant policies. In addition, agricultural areas often are short in mineral resources and have large population, especially agricultural population. Their industrialization levels are often low. The economies in the agricultural areas lack of progressive activities. Employment opportunities are often slim, so the majority of the young and able labors are working as migrant workers elsewhere. From our data analysis, we see that the overall urbanization in the agricultural areas enters the middle stage with rapid growth. In the meantime, urbanization lags behind industrialization. Technological innovation is at low level. Central cities' primacy level is low. The quality of urbanization is on the low end due to lagging behind infrastructure, public service facility, social security systems, and the like. In short, agricultural areas have a weak inefficient industrial basis, poor mobility of factors of production, poor spatial concentration level, and very slow process of urbanization. To accelerate the pace of urbanization in agricultural areas, the keys are to promote the flow of factors of production and enhance spatial clustering. From the existing issues of urbanization in agricultural areas, we propose that we need to properly fix five relationships for healthy, sustainable, and high-quality urbanization. These include, first, a balance between national strategies and local interests, second, relationship between the rapid urbanization rate and providing sufficient employment opportunities for urban and rural residents, third, relationship between urban spatial extension and expansion and effective

management due to rigidly restrictive land availability, fourth, relationship between construction of new rural community and the collective construction land use right transfer, and fifth, the relationship between industrial civilization construction mode and ecology microcirculation civilization construction mode [13].

#### 3.2.1.2 New Urbanization in Agricultural Areas Should Take the "Endogenous Circulating" Mode

The traditional agricultural areas are generally the restricted zones as defined in "National Main Functional Area Planning." The primary goals for those areas are agricultural development and ensuing national food security. Any development, including urbanization must follow strictly the principles of not sacrificing food productivity and agricultural development, ecology and environment services. Such principles pretty much determine any development/urbanization must focus on "agriculture," finding ways to develop agricultural sectors first, actively couple together agricultural resources and processing industries, hence promote an urbanization mode that using the industrialization of agriculture to lead industrialization in the agricultural areas, hence promoting this so-called endogenous urbanization path. Such a choice is not only the fundamental but prudent choice under the strict food security restriction, but also an inevitable result giving full play to their own development conditions.

1. The basic connotation of agricultural areas′ "endogenous circulating" New Urbanization mode. Under the premise of ensuring national food security, based on the rich agricultural resources in agricultural areas, the "endogenous circulating" urbanization mode takes the agricultural industrialization as a starting point, promotes agricultural modernization following an endogenous development cycle path, namely, agricultural base + farmers + leading enterprises. In addition, agricultural modernization will promote new industrialization which in turn promotes New Urbanization hence gradually speed up the process of urbanization in agricultural areas, and constantly improve the living standards of agricultural areas. The urban spatial pattern will be dominated by small towns and new rural communities, which also coordinate with large, medium, and small cities in the agricultural areas.
2. The level of urbanization shall remain low in agricultural areas. Urbanization level in agricultural areas shall basically be lower or equal to the national average. This is because increasing urbanization level is not the priority in agricultural areas. The current level of urbanization in traditional agricultural areas hovered around 30–35 %, which is on the low end. In the future, however, urbanization level in those areas shall be gradually improved to the national average level and stays there.

#### 3.2.1.3 The Implementation of the "Endogenous Circulating" Path of Urbanization in Agricultural Areas

In general, the traditional agricultural areas often have strong agricultural foundations. This is especially true when the agricultural structure is built on the unique natural and geographical conditions. The comparative advantages in agriculture are particularly evident. These advantages include a solid foundation with raw materials advantages, easiness to form industrial clusters focusing on marketing leading products. In addition, developing industries based on local agricultural resources could avoid potential acclimatization issues while introducing outside industries. Moreover, since agro-industry are mostly labor-intensive industries, promoting the development of such industries based on local resources could also help local labors find employment opportunities, reducing the number of migrant labors. For this matter, urbanization/industrialization approaches in traditional agricultural areas shall take full advantage of the excellent agricultural resources to extend the industrial chain through the development of agro-industries, hence promote the industrialization and urbanization process. Accordingly, the New Urbanization strategies in agricultural areas should avoid "exogenous implantation" mode instead relying on "endogenous circulating" mode.

1. The starting point for industrialization and New Urbanization in agricultural areas shall be based on developing agricultural areas' agro-industries with leading enterprises serving as the driving force. Depending on the new trends of intensive development and new requirements of upgrading the leading enterprises, we shall devise policies to promote industrial agglomeration to further support the development of local leading enterprises. In the meantime, local leading enterprises will lead the upgrading of local industrial structure, further deepen the processing level of local agro-industries (from physical properties conversion to chemical processing conversion), and eventually promote the interactive development between agriculture and industries. In particular, developing local agro-industries shall start from the comparative advantages of rich agricultural resources, adjust agricultural structure, expand business scale, and provide fundamental support for agriculture-led industrial development. We will then focus on the deep processing of agricultural products to create a bigger and more robust "agricultural economy." The fundamental mode will be "strong leader, stable base, chain development, training farmers, and good brand," further implement the "company + base + farmers" endogenous development mode. The process will eventually enable the strategic transform from enterprises to the industries, from uniqueness to influencing the entire sector, and from concentration to agglomeration. A successful mode will lead to a coordinated development leading by the modernization of agriculture and emerging of new industries. Urbanization in those traditional agricultural areas will enable virtuous interaction between agriculture and industry, with agriculture supporting industrial development, while at the same time industrial development promotes sustainable agriculture.

2. To consolidate the fundamental support for New Urbanization in agricultural areas, it is necessary to rely on agricultural modernization and vigorous development of modern agriculture. The first priority for promoting New Urbanization in agricultural areas is to actively develop modern agriculture, which entails not only agricultural mechanization, but also agricultural industrialization (developing agro-industries). Agricultural industrialization is essentially how agriculture and its related industries are related and synchronized (in terms of industrial services to agriculture, such as seed and agro-machine provision, and industrial processing of agricultural products, such as food industries and bio-energy industries, etc.). Compared with developed countries in general, development of agriculture and related industries obviously are not synchronized. The current agricultural industrialization structure is not the modern, balanced "company + large-scale family farms" style, instead the traditional unbalanced "company + small-scale decentralized farmers" style. At the same time, due to the urban–rural dual structure, the "companies" are often providing services and products not to the relatively backward rural market, but to the high-end urban markets and even international markets. Such a fairly unbalanced agriculture-industry relationship causes China's agricultural industrialization exhibit a "V-shaped link," i.e., on one end is the modern agricultural products processing enterprises, yet the other end is a high-end urban consumer market. Farmers who are supposed to benefit from such modernization sit and scatter in the middle hence share the least amount of benefit. Such an unbalanced structure is the fundamental constraint for modern agricultural industrialization in China. It is also the fundamental issue faced by modernizing China's agriculture and the so-called "Three Rural Issues" (namely, rural agricultural modernization, rural area development, and rural residents' livelihood). To this end, it is important to use both the external pulling effects of large-scale processing enterprises and the internal force of small-scale agriculture enterprises during marketization to upgrade traditional agriculture. This is an inevitable process of agriculture modernization. Moreover, agriculture modernization will also rely on the leading enterprises and supporting service system to highlight uniqueness, transfer land, extend production and service chains, improve services, and promote base establishment, scale development, and standardization for agriculture. The goals of agriculture modernization are to improve the grassroots agricultural extension service system to provide farmers with extended agricultural technologies, certified seed promotion, pest control, standardization of agricultural production, rural biogas, farmer training, and other services to form a comprehensive agricultural social service system.
3. In agricultural areas, it will be the best practice if we can convert agricultural population locally (or closely) to urban population taking into consideration of improving both farmers and urban dwellers' living standards. The core issue of the "Three Rural" issue is how to improve farmers' income, which boils down to farmers' employment. In China, we cannot avoid the basic fact that we have more people than land. To solve farmers' employment issue, in general, we must rely on two specific strategies. First is to develop rural economy and promote

industrialization of the rural areas to enable farmers to be employed locally. Second is to encourage farmers to work in the cities (usually large cities) so that surplus labors can be efficiently transferred to mitigate the tension between land (too scarce) and people (too many), and farmers' income can be improved. As of now, most migrant workers are still "migrants." Due largely to the household registration system, seldom did many migrant workers think of them as part of the cities that they helped build. Such a status of migrant workers did not really help mitigate the pressure on land resources, and promote agricultural scale development. The pressure on land resources, and the tension between land and people will become even graver after the enactment of the "National Main Functional Area Planning." The planning to a large extend will limit the large-scale high-intensity development of industrialization and urbanization in agricultural areas. In this case, the central government shall quickly implement relevant policies to support migrant workers' housing, social security, and vocational training services. The household registration system needs immediate reform considering the historical contribution of migrant workers over the years of reform and opening up. New policies shall provide explicit support for migrant workers to obtain proposed contract, the woodland, forest rights, homestead, certificate of housing, and other property and the right to sell them, so that migrant workers could seamlessly integrate into city. On the other hand, in so doing, we will also be able to orderly release the population pressure in agricultural areas. Furthermore, we will synchronize the development in agricultural areas via developing the key zones, and optimizing interaction between the development zones.

4. To break agricultural areas' bottleneck (land availability) for New Urbanization, we need to implement the spatial organization pattern of small towns plus new rural communities, and accelerate the construction of locally unique small towns and new rural communities. The fundamental principles for such new spatial organization pattern include "coordinated urban and rural development, cities leading rural development, integrated urban and industrial development, mutual promotion between urban and rural areas, and rational distribution." With such new spatial organization pattern, we shall be able to improve the urban system, optimize the county-level urban and rural spatial structure, strengthen infrastructure construction, promote population and industries to transfer and concentrate to towns, accelerate the construction of locally unique small cities and towns, promote industrial agglomeration and integration with the city, promote migration to small towns and cities, implement intensive land use mode, expand industrial development space, and cluster development factors. In so doing, we can inject new energy for the New Urbanization to lead the development of agricultural modernization. While highlighting the development of locally unique small towns, it is also very important to build the new rural communities, explore new models of building new rural communities, and exchanging land for social security, employment, housing, and fixed income. The new rural communities shall be an integrated location for commercial strips, large-scale vegetable wholesale market, and farmers' resettlement community. There are a

few key issues that require creative thinking, namely, how to obtain sufficient land, fund, and infrastructure, how to address issues during the land acquirement and conversion process such as finding employment opportunities, reasonable livelihood, and resettlement for landless farmers, and how to accelerate the pace of "changing the rural village to rural communities, and farmers to city dwellers." In the process of converting potential lands to urban development, it is important to follow the principle of "issuing rights certification, building credit guarantee system, and establishing new financial organizations" to create new rural financial organizations, such as small loan companies, rural banks, and other mutual funds cooperatives. This is to actively nurture diversified rural financial markets to alleviate the financial constraints for building new rural communities.

### *3.2.2 "City Dwelling—Pasture Grazing" Mode for Pastoral Regions*

Promoting New Urbanization in the pastoral areas can effectively accelerate the pastoral herders' transfer to city dwellers, improve the livestock production efficiency, and alleviate damages to pasture grassland due to overgrazing and other relevant environmental problems. The key issue here is how to promote New Urbanization in the pastoral area with improved livelihood of the herders, but no new rounds of grassland degradation and other environmental problems. We propose as an entry point to promote livestock industrialization, attract external investments from leading enterprises in the pastoral sector, and strengthen the linkage between external investors and local livestock industries so that we can minimize the cost to improve the degree of herdsmen social organization, promote equalization of public services in pastoral areas, and provide better solution to environmental problems during economic and social development in pastoral areas [14].

#### 3.2.2.1 Promoting New Urbanization Is the Key to Building a Moderately Prosperous Society in Pastoral Areas

Since the reform and opening policies were implemented in the late 1970s, with the strong support of national investment, economic and social development in pastoral areas has made remarkable achievements. Living standard for pastoral herders has been greatly improved, especially in fields like the construction of grassland and road and other infrastructure construction in the pastoral areas. During the process of implementing grassland contracting system, more than 90 % of herdsmen have stopped the traditional nomadic life style. Most animal husbandry counties have begun to promote urbanization, and have made remarkable achievements. For

instance, Aksay County has seized the opportunity of relocating the county capital during the "Ninth Five-Year Plan" to vigorously implement the strategy of urbanization development with preferential policies, administrative measures to actively guide the pastoral county population to concentrate in the county's capital to build a standardized herdsmen settlement—ethnic village, herdsmen new village, and garden-pastoral village districts. In general, however, pastoral urbanization rate is very low, generally around 15–30 %. They are basically in the initial stage of urbanization.

In the new round of urbanization development, promoting New Urbanization is the key for pastoral areas to build a moderately prosperous society. Accelerating Urbanization is a strategic measure to stimulate and promote the development of pastoral areas. Pastoral New Urbanization is the primary carrier to promote the development of animal husbandry and improve the quality of living in pastoral areas. It is also a platform for sustainable economic and societal development in pastoral areas and a major breakthrough in building a moderately prosperous society in pastoral areas. It is foreseeable that if urbanization rate increases, many long-standing issues that bothered the pastoral areas, such as basic education, healthcare, communication, and electricity supplies, can be solved quickly and effectively. For one thing, the herdsman's quality of life of will be greatly enhanced once they are settled down. As citizens instead of nomadic herdsman, they will also be able to enjoy societal public services infrastructure resources, such as electricity, water, heating, telecommunications, and other aspects. In addition, education and health levels in the pastoral areas will be improved dramatically. Prior to settling down, nomadic herdsmen lived in highly fragmented areas. The cost for basic modern education, healthcare often had high cost and very poor efficiency and effectiveness. Once they are settled down, the government can concentrate its limited financial resources to provide much better basic modern education, health services, health care, culture and entertainment, and community services. Third, urbanization in the pastoral areas can also facilitate industrial restructuring. Many herdsman started to work in the secondary and tertiary industries after they moved to the cities and settled down. Fourth, when nomadic, scattered livestock practices were organized to livestock industries, the practice can potentially alleviate conflicts between livestock industry and the grassland productivity; hence improve the ecological environment in pastoral areas. With the establishment of pastures tenure system and herdsmen's migration to the cities and engagement in secondary and tertiary industries, livestock management style has changed (more concentrated in agglomerations style). This also reduces grassland overload, increases grassland construction, and improves the ecological environment of grassland.

#### 3.2.2.2 Vigorously Develop Animal Husbandry Industries; and Build Animal Husbandry Focusing Communities

First, through modernizing breeding facilities, and promoting scientific breeding techniques, creating animal husbandry management enterprises, high technology

and capital investment, we will be able to promote the modernization of production management of the livestock industries. Second, via establishing enterprises that rely on the locally unique animal products, we will be able to drastically promote breeding industrialization. For example, the Yili Dairy Product Group can be the leading enterprise that lead and facilitate dairy products breeding base. The Yurun Meat Product Group can be the leading enterprise to facilitate the livestock breeding base construction. Third, the local government shall vigorously promote the development of intensive livestock processing industries to improve the overall economic development of animal husbandry. Fourth, it will be a very good strategy to build concentrated settlement communities in close proximity to small towns and easily accessible area. Such spatial organizations are both convenient for herding or ranching and conducive to promoting the New Urbanization process in pastoral areas.

#### 3.2.2.3 Implementation of Animal Husbandry Leading Enterprises Driven Pastoral Farming Families' Development Mode

A successful example is the new settlement village (Fengshuiliang immigrant village) built by the East Da Mongolia King Construction Group. The Fengshuiliang immigrant village of Dalateqi, Ordos City, followed a path of "enterprise leading, local resources fully exploiting, industries as a breakthrough to successful urbanization." The path is not only a successful example of urbanizing pastoral areas, but also very helpful to upgrading local traditional agro-livestock industries. The East Da Group planned to invest 10 billion RMB Yuan poverty alleviation fund in Fengshuiliang village to create five industrial pillars, namely, Rex Rabbit breeding, logistics services, hi-tech industries, seed cultivation, and culture and entertainment. In the meantime, to support the five pillars, the investment will also be used for construction of road, living environment, education and employment, public health infrastructure, medical insurance, information networks, culture and entertainment, Plaza Park. The goal is to build a demonstrative new rural community that can accommodate up to 120,000 people, and promote integrated development between ecological environment protection, farmers and herdsmen enrichment, and business development to achieve a win–win scenario for enterprises and immigrants in the market operations. As of today, this "new city" has taken shape. Currently, the village has now more than 3000 immigrant households, of which nearly 2000 engage in Rex Rabbit breeding. The average annual Rex Rabbit production is over 2000 which earns the farmers an annual income of up to 50,000–70,000 RMB Yuan. For large-scale farmers, the annual income can be up to 100,000 RMB Yuan. In the future, this new town will further develop the five industries of planting and breeding, logistics, high-tech, tourism and cultural entertainment, and seed cultivation with fully supportive road transportation, cultural living, education and employment, public health, medical insurance, information networks, culture public infrastructure and entertainment, and plaza parks. The new town will serve as a model of a prosperous, intensive, health ecology and environmental protection,

smart and low-carbon example for New Urbanization in pastoral areas. This successful example indicates that the strategy of "enterprise leading, local resources fully exploiting, industries as a breakthrough to successful urbanization" will be an effective approach for implementing New Urbanization in pastoral areas. By building breeding and processing bases, the leading enterprises both innovate the operation mode industrialization of agricultural and pastoral husbandry and establish new relationships between enterprises and the interests of farmers and herdsmen. Such practice not only attracts farmers and herdsmen to stay in the city, and enrich their livelihood, but also facilitates the concentration of locally unique resource processing industries and logistics service industries. In so doing, it creates more employment opportunities and promotes vivid urbanization. Meanwhile, the new town demonstrates the ways of creating good living environment, service environment, and how to attract population, which formed a positive interaction between developed industries and concentrated population in a prosperous new town.

#### 3.2.2.4 Implementation of the New Pastoral Living Model of "Living in Town, Practicing Animal Husbandry in the Country"

The best way to promote the New Urbanization in pastoral areas is to let the herdsman to live in towns/cities, but practice animal husbandry in the countryside. In particular, the elderly and children stay and engage in urban activities in the cities/town, the young adults will work in the countryside for grazing or grazing hires. For example, in Gansu's Aksay and Subei areas, a considerable number of herders are hiring herdsman to take care of their livestock, while at the same time they engage in secondary and tertiary industries in the cities. Since livestock production is different from farming, this approach is fairly feasible and mutually beneficial. In fact, in countries like New Zealand and Australia, this has been a norm for quite some time. From the practical perspective in pastoral areas, such a make-shift way through this transition from pastoral to urban residents, from engaging in animal husbandry after several years completely out of the livestock industry, into working in the secondary and tertiary industries shall the primary goals of pastoral areas' development. The remaining part of the herdsman can then form into a larger family ranch. The implementation of "living in the city, practicing animal husbandry in the country" shall be a new pastoral settlement patterns. Of course, this is not to say that all herdsmen shall be concentrated to the cities/town, the actual scenarios shall adapt to local conditions.

Because the promoting of New Urbanization in pastorals is going to be a long term, somewhat difficult, and involving a wide range of aspects, it shall be regarded as a major historic pastoral reform. It suggested that building small towns/cities in the pastoral areas shall be integrated in the process of the natural forest protection project, grassland vegetation restoration project, and the reforestation (re-grass) projects that are currently implemented at the national level. We need to increase investment in constructing these new small towns/cities in the pastoral areas,

establish "pastoral small towns' subsidies" from work-relief programs, national bonds, and poverty alleviation funds. At the same time, we also need to increase financial support for infrastructure construction in animal husbandry counties, introduce supporting policies and measures to facilitate the construction of pastoral small cities and towns. Governmental subsidies for willing herdsman to settle into the city is another strategy that can be adopted, especially in the key ecological protection zone, migrants shall receive relatively large amount of financial and other assistance to settle in those small towns/cities. Relevant polices in building land, supporting the construction costs, employment, and schooling for their children should be devised and implemented efficiently. Household registration system in pastoral areas needs to be reformed to eliminate the agricultural and non-agricultural household registration. Instead, a unified household registration shall be implemented and managed by where they live (instead of what they do). In addition, certain preferential policies can be devised and implement to reward herdsman who migrate to the cities and set up secondary and tertiary industries.

### 3.2.3 *"Urbanization Based on Mining" Mode for Mining Regions*

Resource-based cities, especially the ones in the mining areas, are important energy resource strategic support bases, and also important support for the sustainable and healthy development of national economy. Promoting sustainable urban development in the mining areas is the inevitable requirement for accelerating the transformation of economic development, and achieving the goal of building a moderately prosperous society. It is also an important task to promote balanced regional development, promote the overall development of new industrialization and urbanization, maintain social harmony and stability, and establish ecological civilization. Currently, a large proportion of cities in China are industrial and mining resource-based. Those typical towns and cities often face increasing resources and environment pressure with very little radiation driving ability and limited intensive development capacity. Due to long lasting serious historical issues, the endogenous power of restructuring and developing within these cities is rather weak. Overall, there are nearly 70 million square meters of squatter settlements that need urgent reform, about 140,000 ha subsidence areas that need treatment, more than 60,000 unemployed miners who are in need of employment, and over 1.8 million people who need subsistence allowance. In those cities, the native industries have strong dependence on resources. Mining often accounts for more than 20 % of the secondary industry. Modern manufacturing and high-tech industries are in their infancy. Support security for further developing alternative industries is seriously inadequate. To promote New Urbanization in mining areas, we propose the following modes.

#### 3.2.3.1 Development of Green Mining Industry, Integration of "Mining Activities and Urbanization," and Construction of Alternative Industries Cluster Zones

In the process of urbanization in mining areas, it is important to allow the market mechanism to play out fully so that we can pursuit the integration and interaction of "mining activities and urbanization," promote the integration of both urban and industrial development and mining and urban development. To achieve this, it is crucial to transform and upgrade traditional resource-based industries, develop green mining industry, foster the growth of alternative industries, accelerate the development of modern service industries, encourage the development of strategic new industries, and promote transformation from single resource-based mono economy to diversified economy. Both the local government and its planning agents shall correctly handle the relationship between the joint development of above-ground and underground industries, strengthen their overall planning, optimize the industrial layout, and guide industries to concentrate to industrial parks and gathering areas to form intensive, distinguishing development patterns. In addition, this urbanization mode requires relying on the original foundation, implementing reconstruction, and new construction of a number of distinctively characteristic specialized industrial parks and gathering areas, strengthening transportation, water, electricity, and other supporting infrastructure, and building important carrier and platform for industrial agglomeration. Using the standards in science and technology, environmental standards, investment strength, ability to absorb employment, we shall actively cultivate and introduce a number of leading enterprises. Moreover, it is necessary to improve the industrial chains, enhance industrial supporting capacity, promote joint development of industrial and mining-related industries, create distinctive industrial clusters and alternative industries clusters, and reconstruct a number of alternative industries parks and gathering areas.

#### 3.2.3.2 Change the Mode of "Building Homes Where Mines Are" to "Building the Cities with the Mine" Mode

For a long time, the industrial structures of China's industrial and mining areas were largely evolving around extractive industries and relevant activities. Urbanization mode in those areas often followed a "building homes where mines are," which often causes the main part of the governing bodies of mining enterprises and the governments were located outside the city (in the mining areas), forming a large number of scattered and independent mining shanty towns that were detached from the cities. These mining shanty towns often do not have close economic ties with the cities, and often had limited service functions. The tertiary industries were scattered and lagged behind, and can hardly meet the needs of the residents there, hence it is difficult to

form an effective driving force for urbanization. Apparently, increasing the intensity of reforming mining shantytowns is an important starting point to promote the transformation of resource-based cities in the mining areas. It is also an important task to promote the New Urbanization in mining areas. In order to enhance the leading role of large-scale mining companies' driving for urbanization, it is necessary to change the traditional urbanization mode of "building homes where mines are," to "building cities with the mine." For example, Shanxi Province decided to choose five pilot coal mines to experiment "building cities with the mine" strategy and establish industrialization drive mechanism to promote urbanization in mining areas. These cities and mines are the Eastern Zhou Kiln Coal Mine of Datong Coal Company in Datong City, Pingshuo East Coal Mine of China Coal Group in Shuozhou City, Wangjialin Coal Mine of Shanxi Energy Group in Xinzhou City, Longquan Coal Mine of Taiyuan Coal Gasification in Taiyuan City, and Xiegou Coal Mine of Luliang Coking Coal Company in Luliang City. Within these five cities, the City Halls lead the preparation of devising the "building cities with mines" plans. These plans aim at developing non-coal-related industries, relying on local enterprises to develop packaging and storing, trade marketing, consulting, catering trade, and other services, to achieve "localization of business and employment" and improve the public service system. In the meantime, for those villages that have coal mining directly below, the government will implement plans to relocate the entire village and prepare sufficient employment opportunities for the relocated villagers.

### *3.2.4 "Merging Residential Zones with Local Towns" Mode for Mixed Agriculture-Forestry-Pastoral (Field) Regions*

The agriculture–forestry–pastoral regions (often refers to as "field areas" since those activities require large fields and are often located in backwater areas where lands are abundant and relatively cheap) refer to the various state farms, pastures, fisheries, forestry, and livestock farms. Since these areas are often frontiers and national border lines, residents there are often state employees who were sent to develop the frontiers and protect the borders. These workers usually have urban household registration, but their livelihood depends on agriculture, and do not fully enjoy benefits like other urban residents. In addition, those field areas often have large numbers of migrant population. Due to their specific geographic locations, these field areas often are the "inaccessible" places for implementing New Urbanization. On the other hand, though scattered and in relatively remote areas, the total population size and land mass in those areas are quite large, often with fairly severe historic legacy issues that need to be addressed by implementing the New Urbanization strategies. To illustrate effective strategies in promoting New Urbanization in these field areas, we present the example we conducted on 26 State Owned field areas in Daqing City with different sizes and different affiliations.

#### 3.2.4.1 Status and Problems of Current Urbanization in Field Areas

From the field investigation, we found that there were 26 state owned agriculture–forestry–pastoral–fishing areas with different sizes and different affiliations in Daqing City, Liaoning Province. There are about 67,100 employees in these field areas. Urbanization in those areas exhibits some common characteristics and problems.

1. There are more migrant workers than local employees. Urbanization level is extremely high (since urbanization level is calculated based on the percentage of urban residents in total population, and the majority of residents in those areas are technically "urban residents," yielding a very high level of urbanization). Urbanization quality, on the other hand, is fairly low. The prevalent phenomenon in the 26 field areas in Daqing City is that there are more migrant workers than State employees. Often migrant workers accounted for over 50 % of the total population. For example, Yinlang Ranch has a total permanent residents of 12,600 people, while 4000 (about a third) of them are migrant workers who have been doing farm work there for decades. Xinghuo Ranch has 4300 permanent residents, and 2200 of them are migrant workers (over 50 %). Hongji Ranch has 5000 permanent residents; 2800 of them are migrant workers. Since urbanization level is calculated based on the percentage of urban residents over total population. All of the field areas have over 90 % urbanization rate. Yet urbanization quality in those areas is much lower than the average urbanization quality in Daqing City.
2. The field areas often have very complex affiliations that change frequently. Among the 26 field areas, Heping Ranch, Zhaoyuan Farm, Dashan Breeding, and Planting Farm are managed by the Heilongjiang Provincial Bureau of Reclamation. Green Grassland Pasture Farm is affiliated with Heilongjiang Province Bureau of Reclamation Suihua Branch office. Chunlei Farm is affiliated with Daqing City. Xinghuo Ranch, Hongji Ranch, Yinlang Ranch, Dongfeng Farm, Xinglong Ranch, Hongqi Forest, Maoxing Lake Fisheries, State-owned Weixing Breeding Stock, Leyuan Breeding Farm, Changqing Forest, Yinguang Breeding Stock Farm, Julang Ranch, Reed Field, Xinxing Livestock Farm, Lindian Fishery, Duishan Dairy Farm, Hongqi Breeding Stock, Sijiazi Forest, Shirengou Fisheries, Xindian Forest, Kaoshan Breeding Stock Farm are affiliated with and managed by various districts and counties in Daqing City. Such a complex and frequently changing affiliation system leaves those field areas to often be the "black holes" of management.
3. Due to the lack of efficient management, the field areas often are lack of planning. The built-up areas are often full of disorderly buildings that often lead to heavy penalty. The vast majority of the field areas do not have comprehensive development and construction plans. The residential buildings of each field area

lack appropriate order, so are other building types, which failed to form a relatively rational pattern of industrial development and residential allocation pattern. All construction projects in those field areas cannot receive appropriate approval. Oftentimes, the complex management and affiliation system makes any proposal of new development hard to get any approval at either the village level or the city level. All the ranch houses are 100 % illegal constructions, forming "no basis for building, yet all basis for penalty" irregularities.

4. The field areas often have disorderly functions with insufficient infrastructure. The vast majority of the field areas often have very confusing functional zone planning (or no planning at all). Local infrastructure is severely lagging behind the needs. Economic development is often restricted by available land. Comparing to the regular townships, local infrastructure, public service facilities, and local living environment are fairly poor. Yet in the meantime, there is a strong intention by those state workers to promote urbanization and industrialization.
5. The state employees in the field areas are often not benefiting from their urban household registration. In fact, workers in those field areas, though engage in agriculture, forestry, animal husbandry and fishery, they are actually urban residents. On the other hand, partly due to the chaotic management, they often do not enjoy the various benefits of urban residents such as salaries and relevant health cares.

#### 3.2.4.2 Implement the New Urbanization Development Mode of "Building the Cities Within the Field Areas"

From the global perspective of Daqing City, we regard these 26 Field areas as the primary component for implementing Daqing City's New Urbanization. In so doing, the mode must take into full consideration of the various industries (agriculture, forestry, animal husbandry, and fishery) so that they will be seamlessly embedded into Daqing's grand pattern of New Urbanization development for unified planning and construction.

1. The first thing is to merge some of the field areas to reduce the numbers from 26 to 15. These field areas will be the fifth level in the urban system hierarchy in Daqing City. As a matter of fact, during the establishment of Daqing's urban system, the districts and counties have implemented various ways to urbanize these field areas. Specifically, there are three primary approaches employed. First, if the area is close to the city or suburban area, they will be integrated to the main city plan. A typical example is the Chunlei Farm. Second, some of the relatively small field areas are gradually integrated to their affiliated villages or counties, and becoming an important part for promoting urbanization in those

villages or counties. Third, if merging those field areas becomes difficult due to complex management system, they will be kept as is but targeted for better planning. The final 15 field areas include: Xinghuo Ranch, Hongji Ranch, Yinlang Ranch, Heping Ranch, State-owned Weixing Breeding Stock, Leyuan Breeding Farm, Maoxing Lake Fishery, Duishan Dairy Farm, Hongqi Breeding Stock, Sizaizi Forest, Shirengou Fishery, Xindian Forest, Kaoshan Breeding Stock, and Green Pasture Ranch. These 15 field areas are then regarded as the fifth level (village level) unit and embedded into Daqing City's hierarchical urban system, with unified planning and construction (Table 3.2).

2. There is strong need to design a specific development plan for Daqing City to promote New Urbanization for its field areas. This is needed because the numerous field areas are scattered, with a variety of developmental and management issues, highly mobile population structure, and poor development environment. A specific *New Urbanization Plan for Daqing City's Agriculture-Forest-Pastoral-Fishery Using Area* would provide the most needed and fundamental guidance and modes for promoting New Urbanization strategies in those areas, devise appropriate population management and land use modes, and point the way for intensive land use and new community construction.
3. Promote the cooperation between the village and towns and the agriculture–forest–pastoral–fishery using field areas to fully embed towns/cities within the areas. The goal is to establish a healthy, cooperative urbanization development and village/township urban system. For instance, in Lindian County, Changqing Forest has been merged to Sijiqing Town, Reed Breeding Field to Hongqi Town, Fishery to Sanhe Village, Yinguan Breeding Stock to Hongqi Town, and Xinxing Breeding Stock to Dongxin Village. The future focuses will be on the newly merged field areas, namely, Reed Breeding Field, Xinxing Breeding Stock, and Yinguan Breeding Stock. Specifically, for Reed Breeding Field, we shall take advantage of the opportunity of relocating the core village due to the recent establishment of Zhalong Natural Reservation to merge the first and fourth sub-fields to the headquarter with the second and third sub-field. The headquarter will then evolve to be the village center. We will then invest to build appropriate infrastructure and public services facilities for the village center. For Xinxing Breeding Stock, we shall take advantage of the opportunity that Daqing City attempts to build a few demonstrative new villages, merge the current four sub-fields to an appropriate new location as a high-quality new village center and demonstrative base. For Yinguan Breeding Stock, we shall merge all the sub-fields to the where the headquarter is and build the headquarter to be a village center with appropriate infrastructure public service investment. In the meantime, we will further develop farming and breeding industries as the village's main industrial base.

**Table 3.2** New Urbanization mode of building towns within State-owned field areas in Daqing city

| County/district name | Number of field areas | Name of field areas | Affiliation | Permanent urban residents | Trend for urbanization | Function division and development direction |
|---|---|---|---|---|---|---|
| High-tech zone | 1 | Chunlei farm | State-owned, city management | 5800 | Merged to the high-tech zone for urban land use | Urban land use, part of the city proper |
| Ranghulu district | 3 | Xinghuo ranch | State-owned, district management | 4300 | Concentrate the population to build a central village, as one of the 160 central villages in daqing city | Dairy cow breeding; hop spring (spa) vacation land; greenhouse plantation; pick-your-own park |
| | | HongJi ranch | State-owned, district management | 5000 | Merged to and managed by daqing city economic and technological development zone | High efficient plantation, characteristic breeding; countryside leisure tourism, farmhouse tourism, equipment manufacturing |
| | | Yinlang ranch | State-owned, district management | 12,600 | Merged to the city proper, linked with hongwei park | Livestock breeding, industrial parks |
| Longfeng district | 1 | Dongfeng farm | State-owned, district management | 600 | Merged to Longfeng district for urban land use | Urban land use |
| Honggang district | 1 | Xinglong ranch | State-owned, district management | 750 | Merged to Xinshugang township, serving as the base for Xinglong industrial park | Livestock breeding |

(continued)

**Table 3.2** (continued)

| County/district name | Number of field areas | Name of field areas | Affiliation | Permanent urban residents | Trend for urbanization | Function division and development direction |
|---|---|---|---|---|---|---|
| Datong district | 2 | Heping ranch | Provincial agricultural reclamation bureau | 10,833 | Kept as the fifth level unit in Daqing's urban hierarchical system | Livestock breeding |
| | | Hongqi woodland | District government | 100 | Merged to Linyuan township to support it to be one of the 12 important central townships | |
| Zhaoyuan county | 2 | Maoxing lake fisheries | State-owned, county management | 1350 | Kept as the fifth level unit in Daqing's urban hierarchical system | Fishery |
| | | Zhaoyuan farm | Provincial agricultural reclamation bureau | 900 | Merged to Xinzhan township, to support it to be one of the 12 important central townships | Agricultural plantation |
| | | State-owned satellite breeding stock | State-owned, county management | 760 | Kept as the fifth level unit in Daqing's urban hierarchical system | Livestock breeding |
| | | Leyuan thoroughbred field | State-owned, county management | 130 | Kept as the fifth level unit in Daqing's urban hierarchical system | Livestock breeding |

(continued)

**Table 3.2** (continued)

| County/district name | Number of field areas | Name of field areas | Affiliation | Permanent urban residents | Trend for urbanization | Function division and development direction |
|---|---|---|---|---|---|---|
| Lindian county | 6 | Changqing farm | State-owned, county management | 1300 | Merged to Sijiqing township, to support it to be one of the 12 important central townships | Woodland plantation, hop Spring (spa) new city and vacation land |
| | | Yinguang breeding stock | State-owned, county management | 1200 | Merged to Hongqi township | Livestock breeding |
| | | Julang ranch | State-owned, county management | 1000 | Merged to Hongqi township | Livestock breeding |
| | | Yuwei field | State-owned, county management | 1100 | Merged to Heminghu township, to support it to be one of the 12 important central townships | Tourism and vacation land |
| | | Xinxing livestock farms | State-owned, county management | 1300 | Merged to Dongxing county | Livestock breeding |
| | | Lindian fisheries | State-owned, county management | 1000 | Merged to Heminghu township, to support it to be one of the 12 important central townships | Hot spring (spa) tourism and vacation, fishery, fishing houses |

(continued)

**Table 3.2** (continued)

| County/district name | Number of field areas | Name of field areas | Affiliation | Permanent urban residents | Trend for urbanization | Function division and development direction |
|---|---|---|---|---|---|---|
| Duerbote Mongolia autonomous county | 8 | Duishan dairy farm | State-owned, county management | 1890 | Kept as the fifth level unit in Daqing's urban hierarchical system | Dairy cow breeding |
| | | Hongqi breeding stock | State-owned, county management | 1800 | Kept as the fifth level unit in Daqing's urban hierarchical system | Dairy cow, geese, fox and panther breeding |
| | | Shijiazi woodland | State-owned, county management | 260 | Kept as the fifth level unit in Daqing's urban hierarchical system | Woodland plantation |
| | | Shirengou fishery | State-owned, county management | 1900 | Kept as the fifth level unit in Daqing's urban hierarchical system | Fishery |
| | | Xindian woodland | State-owned, county management | 1200 | Kept as the fifth level unit in Daqing's urban hierarchical system | Woodland plantation |
| | | Kaoshan breeding stock | State-owned, county management | 2960 | Kept as the fifth level unit in Daqing's urban hierarchical system | Holstein dairy cow breeding |
| | | Dashan breeding farm | Provincial agricultural reclamation bureau | 4100 | Kept as the fifth level unit in Daqing's urban hierarchical system | Livestock breeding |
| | | Green meadow ranch | Provincial agricultural reclamation bureau, Suihua branch | 3000 | Kept as the fifth level unit in Daqing's urban hierarchical system | Livestock breeding |

## 3.3 The Gradual Mode for China's New Urbanization

### *3.3.1 Fundamental Thoughts for China's Gradual Urbanization*

The gradual urbanization mode for New Urbanization is to accelerate urbanization in rural areas based on different urbanization gradients. Specifically, there are four gradual processes, namely, strengthening the county centers' construction and promoting farmers to become urbanites for urbanization; strengthening the township centers' construction and promoting farmers to become township citizens for urbanization; strengthening the village centers' construction and promoting gradual transformation of farmers to township citizens for urbanization; and strengthening construction of villages' central communities to promote farmers to become community residents to achieve new gradual process of urbanization in rural communities (Fig. 3.2). Such mode focuses on the village centers as the pilot locale to progressively promote urbanization. The progress of promoting natural villages and rural communities to the center of village, and then promote the center of village to be small townships is a feasible mode for gradual urbanization. With such mode, farmers can turn into urbanites and enjoy the benefits of urban residents without the need to migrating to other cities or towns. This is important because currently the rural areas still need large numbers of farmers and agriculture workers to cultivate the land. Villagers will still be rural population. Their homestead will be converted to vertical buildings. The process involves literally no change for the village and farmers. On the other hand, we do recommend the implementation of the "dual household registration" under the current household registration system. Under such "dual household registration," the farmers can be both rural residents so that they will have their lands and are able to engage in agricultural production and township urbanites as long as they have fixed investment (housing) in the township or cities. In so doing, the farmers will not lose their land use rights, while in the same time enjoy (and promote) urbanization and relevant benefits.

#### 3.3.1.1 Implementing the Gradual Urbanization Development Strategy Based on Community Centers, Village Centers, and Township Centers

Strengthening the village and the town centers' construction and accelerating the adjustment of urban space layout and industrial structure are crucial for gradually forming a rational division of labor and efficient and orderly urban spatial structure. The keys for implementing a "Centers-based" gradual urbanization strategy is to strengthen the integration of urban and rural settlements, improve the ecological environment, improve public facilities and infrastructure service levels, promote the industry to engage in centralized management and scale concentration, concentrate industries to industrial park, and concentrate farmers to central communities, village

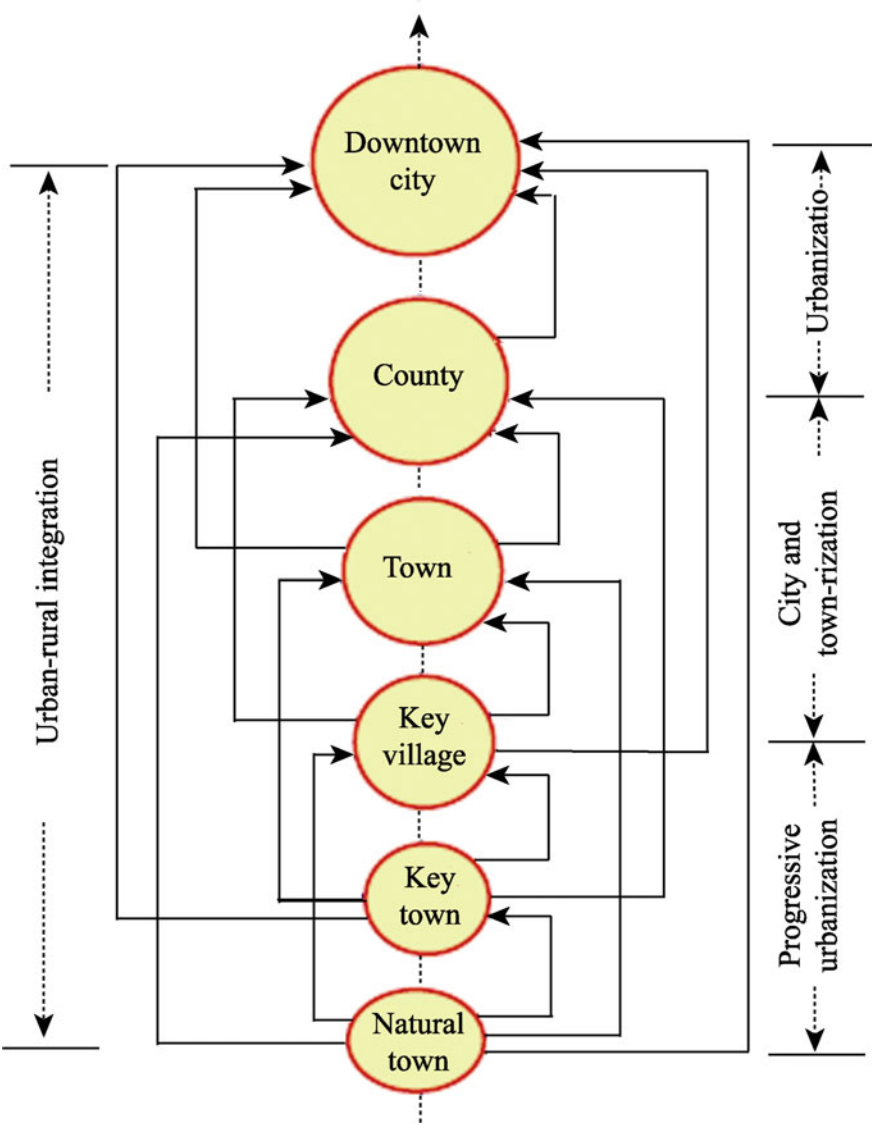


**Fig. 3.2** Schematic diagram of progressive transition path of new-type urbanization

centers, and township centers. For example, while promoting the progressive process of urbanization, Daqing City has planned to build six county-level cities, 12 central towns, 160 village centers and 500 central communities in order to stimulate the development of the city's 58 towns, 26 field areas, 483 administrative villages and 2548 natural villages and realize the coordinated development of urban and rural areas. In order to accelerate the progressive process of urbanization

development in rural areas, we suggest implementing rural land transfer system so that the collectively owned lands can become state-owned land but farmers have the rights to put the land on markets following national land use/land transfer regulations in rural areas. Currently, since the land ownership problems cannot be solved, farmers will not own the properties even if they purchased them. Those properties hence cannot be moved, cannot be traded, and cannot be mortgaged. In the meantime, since national regulations mandate that collectively owned land cannot be used for real estate development, which renders developers unprofitable, hence they will not invest in rural areas. If we introduce the market mechanisms in rural area, on one hand, we can increase the enthusiasm of farmers to build the new community centers. On the other hand, large amount of rural homestead land can be transferred for urbanization while farmer can exchange these homestead for equivalent urban housing spaces. In addition, the premise for urbanizing farmers is that the villages have considerable industry supports and village enterprises, such as centralized transport companies, aquaculture companies, farm machinery companies, concentrated vegetable companies, and agricultural processing companies.

#### 3.3.1.2 The Four Processes for Gradient Gradual Urbanization

1. Strengthen the construction of county-level cities, promoting farmers to become urbanites to achieve urbanization. For example, in Daqing City, the Honggang New District, Datong Town, Zhaoyuan Town, Zhaozhou Town, Lindian Town, and Taikang Town can serve as the political, economic, and cultural centers for relevant rural areas and core priority sub-central cities for promoting the new urban system in Daqing. The outskirt villages of these 6 central towns can gradually merge into lower-level townships. Farmers can then turn into urbanites locally. In the meantime, it is necessary to invest and develop supporting infrastructure and public services such as employment, education, healthcare, and housing for the newly transformed urbanites.
2. Strengthening the construction of central towns and promoting farmers to become township residents to achieve urbanization. Construction of the township centers shall follow the fundamental principles of comprehensive planning, classified guidance, highlighting focus, and demonstrative driving. In the meantime, it is crucial to perform appropriate merge and reintegration and choose alternative locations with superior geographic conditions, strong development foundation and great potential for development to purposefully nurture a series of central towns to achieve aggregate effectiveness and regional competitive advantage. For example, Daqing City plans to build 12 town centers. The plan indicates that construction land area per capita should be controlled within 120 $m^2$. Depending on different underlying conditions, resource endowment, and development levels of the various towns, we shall devise appropriate strategies to guide and encourage interaction, collaboration, and

joint development between towns with closer economic ties and complementary resources to form a scenario with central towns guide and drive the development of small towns and rural areas. Based on the central towns' location, resource characteristics and their functions, with the support of tax breaks and other preferential policies, we shall guide and encourage the urban industrial enterprises to explore effective ways of "letting the enterprise drive township and village development, and integrating urban and rural development." In the meantime, we shall encourage and support urban industrial and social funds to extend to rural areas, to invest in agro-industry, agricultural production materials industry and other related industries to promote urban and rural industries integration. It is also important to explore new rural economic development modes with the village collectively exchanging land for investment to both develop the rural area and create job opportunities for farmers.

3. Strengthening the construction of central villages, promoting the progressive transfer of farmers to township residents to achieve a gradual process of urbanization in rural areas. The central villages are the "reserve forces" for small towns and cities for sustained urbanization. Healthy development of the central villages is of critical importance for both urbanizing rural life style and establishing rural material and spiritual civilization. It is only through the development of rural settlements in the central villages that we can hope an integrated urban and rural development. Actively promoting the integration of villages and relocating villages into the townships are important to relocate, consolidate, and transform dispersed rural settlements to expand the scales of central villages for intensive use of land. In Daqing City, it is planned to build 160 central villages. Construction land per capita should be controlled within 150 $m^2$. The plan attempts to strengthen the integrated and comprehensive planning of urban and rural areas, take various measures to merge large oilfield sites into nearby townships and cities, relocate small mining settlements within the high-yield oil fields so that oil field mining can focus on specific locations to reduce the waste of land due to the existing decentralized distribution of land. In addition, it is also imperative to actively promote the infrastructure construction in rural settlements, and gradually establish infrastructure services system in line with the level of economic and social development of rural settlements.
4. Promoting the construction of village central communities to facilitate the farmers to concentrate to these communities, and to achieve a gradual process of urbanization. Considering the fact that concentrating all rural residents to a central village or general administrative villages will be hard to achieve in short term, an alternative is to build village central communities within the central villages or by combining natural villages in neighboring administrative villages. The village central communities hence serve as a platform for gradual urbanization of the rural areas. When the conditions are ready enough, we shall then be able to relocate the gradually centralized population in the village central communities to central villages or central townships/cities. In so doing, we are

able to progressively promote farmers to become community residents, township residents and eventually urbanites. For example, Daqing City plans to build 500 village central communities as transition locations to drive urbanization process for the 2548 natural villages.

### 3.3.2 Autonomous Mode for Gradual Urbanization

In urbanizing China's rural areas, the active and passive urbanization co-exist. In active urbanization, the farmers and the collective village organization actively seek out urbanization by exchanging land with the opportunities to turn to urbanites, and enjoy the benefits of urbanization afterwards. On the other hand, in passive urbanization, the farmers' lands were acquired by the State and the farmers were turned to urbanites whether the farmers agree or not. In such a mode, the farmers were not really turning into urbanites and they usually do not enjoy the benefits from urbanization. More importantly, the passive urbanization almost always involves some types of sever issues such as rights protection, against the farmers' free will, and even deprivation of farmers' land. For this matter, it is hence critical to properly manage the relationship between active and passive urbanization. Exploring various ways to properly reduce the irrational and unfair passive urbanization shall be the next priority agenda item to promote the New Urbanization strategy and realize the real urbanization of farmers.

Active urbanization follows the principle of "respecting the wishes of farmers, putting harmony and stability as the top priority." It basically requires "farmer-led, self-determination, self-assessment, self-construction, voluntary fund-raising, and self-management." It is an independent development model of urbanization, and can effectively help achieve the so-called "zero resistance, zero complaints, and zero petition." In the meantime, active urbanization also follows the four "unified" construction principles, namely, "unified planning, unified financing, unified construction, and unified management." This so-called "five self, four unified and three zeros" independent urbanization model has won the trust and support from farmers since it fully respects public opinion to let the farmers make their own decisions; fully plays to democracy so that farmers can assess their own demolition; fully finances through convergence of private capital so that the farmers themselves can engage in the construction; and adequately protects farmers' benefits so that farmers really gain. A successful example was observed in the Minqiang New Village, Bajinzi Township, and Datong District of Daqing City. Minqiang New Village located about 350 m west of the Sada Road. There are 117 households, 443 people, and 191 houses, with a total land area of 73,984 $m^2$. For two years, Daqing City invested 452 million RMB Yuan to fully renovate the entire village. The planned land area is 227,300 $m^2$. Total build-up area is 139,600 $m^2$. After its completion, the New Village will be able to accommodate 860 households. For Minqiang New Village, its "five self" can be detailed below.

#### 3.3.2.1 Self-decision

1. Checking the facts. On December 2, 2011, the township communist party committee of Bajinzi Township set up a village construction and demolition Command Headquarter (hereinafter referred to as the Headquarter) for Minqiang Village. This committee is responsible for organizing, coordinating, and promoting related work. The committed checked the village's residence, houses, courtyards, news, and other villager-related events on the same day. It then promptly held a special meeting to hear an investigation report. After the report, the Headquarter decided to continue in-depth investigation, redesigned the questionnaire to establish individual profiles. They generated photos and videos of residents' houses and yards, set up a household archive for each household, and made multimedia CD-ROM with a text description. To be open and transparent and eliminate the suspicion and distrust of the villagers, on February 18, the Headquarter did another round a thorough investigation in Minqiang Village, and held a village General Assembly. Each household elected a representative with a total of 117 people. They were further divided into four groups. Members of the four groups led by the Headquarters investigated the 191 houses, 117 yards comprehensively and verified previous data to make sure the final outcome of this time's investigation is consistent with the previous Headquarter investigation. After that, the villagers were no longer critical to the village cadres. Instead, they reached out from behind closed doors to cooperate with the Headquarter. Such practice provides detailed information for coming demolition, relocation, and reimbursement process.
2. Emphasizing public opinions. Minqiang Village is adjacent to Daqing city. There are more than 40 migrant households. Some of them are from the city due to demolition and relocation. This group of residents is often quick to complain. If the demolition work that involves the interests of the people is not handled properly, it can easily lead to mass incidents. In response to this complex situation, the Bajinzi Township party committee timely started creating risk assessment mechanism for major issues regarding social stability, and set up a commanding group for risk assessment led by the township principal leaders and members of the village cadres. The risk assessment group held 20 various seminars at different levels with the villages, issued 117 questionnaires regarding building the new village. The efforts were eventually paid off, while 100 % of the residents agree to build the new village, and indicating that they are also 100 % satisfactory. Apparently, the key for such high willingness to proceed is a satisfactorily devised compensation plan. At the very beginning, the Township party committee held a town hall discussion regarding how to assess the values of the properties and corresponding compensation. The debate was on whether such evaluation shall be done by a third party assessment company or by the villagers themselves. The final decision is that it will be more appropriate to let the villagers to decide how the compensation plan shall be devised. The party committee hence decided to create a 12-people voluntary propaganda

team, consisting of 12 rather prestigious and respectful members of the village to explain the policy and guide the villagers to evaluate their own properties. Each propaganda team member is responsible for 10 households. They often discussed the benefits and costs of the demolition and rebuilding plan with the villagers in a causal, but lively fashion, which seems to work the best for most of the villagers since the team members are often well respected and considered just and fair. Such a let-the-villagers-persuade-the-villagers strategy has far superior success chances than hiring a third party assessment company since the later often involves high cost, long dispute over demolition, and complex procedures.

3. Decide the final program. On February 19, 2012, all 117 households participated in the assessment meeting. After entering the venue, the villagers drew two lots. The first one was determined the order of assessment. The second lot was simply to determine the seat number in the venue. After the lots were drawn, the moderator explained the benefit and costs of using either a third party assessment company or using the villager representatives. The villagers then voted. The final results indicate a 116:1 in favor of the villager representative proposal.

#### 3.3.2.2 Self-assessment

1. The villagers determine the assessment approaches. Since Mingquan Village has relatively large portion of migrant workers and many illegally built constructions that often lead to difficult demolition, the township party committee proposed the "compensation based on overall assessment of the entire household's courtyard" approach. Namely, the assessment will be based entirely on the household courtyard regardless of ownership certificates, business licenses, and household registration. The proposal was unanimously approved by the villagers.
2. The villagers elect their evaluation representatives. Via strictly following the Organization Regulation of Villagers, the villagers elected 30 representatives from the 117 households (about one representative per 4 households). To avoid large families take advantage of their sheer numbers, the representatives are determined by the last names so that the same last name will not representing one another. Smaller families will just enter random draws for every three households. The entire election process was supervised by the villagers and outside notary company. After 17 round of election, the 30 representatives of assessment were determined.
3. The villagers determine the assessment price. To be strictly confidential, the mobile phones of the 30 representatives were stored to prevent inside communication. The seat numbers were re-drawn indicating entering the formal assessment process. Based on early collected raw data, two screens were set up. One plays videos of the farmer courtyard. The other showed textual description. Members of the assessment representatives evaluated each

household's courtyard made with reference to the market trading price. A total of 117 assessments with 117 assessment tickets were conducted. All 117 tickets were collected after the evaluation, and each household were created a portfolio. After the end of the evaluation, supervised by the village representatives, the assessment were divided into four groups for final count and calculation. The five most expensive and five least expensive evaluations were discarded. The average of the rest evaluation will then be used as the final compensation amount. Since the total compensation for Minqiang Village cannot be over 40 million RMB Yuan. The committee decided that if the final evaluation is over 40 million RMB Yuan, then every household will have to be adjusted proportionally to stay within 40 million RMB Yuan. Surprisingly, the final result indicated that the final evaluation was only 34.05 million RMB Yuan, with a surplus of 5.95 million RMB Yuan. After consulting with the villager representatives, the township party committee decided to divide the surplus to each household. The households hence had an average increase of 19.2 %. The villagers were very happy about the evaluation. Some even commented that they won't even be able to sell for that price. The 117 households then signed the demolition, relocation and compensation contract on-site. On April 9, 2012, the commanding group initiated the demolition process, and was done with 2 weeks. By May 1, all the compensation moneys were distributed to the villagers, and the new construction started 5 days later (May 6).

#### 3.3.2.3 Self fund-raising

The construction of Minqiang Village has relied fully on collecting private capitals, and let the farmers build their own home. Based on the requirements of developing livable residential area and potential industrial zones, the Minqiang Village planned its construction at a high starting point in a hope to create a demonstrative model for small towns. The construction invested 250 million RMB Yuan for the first phase. The village party committee led the initiative to raise funds from the farmers. Farmers who have registered within the village can all participate by investing. Their household will be directly registered in Minqiang New Village after it's done.

#### 3.3.2.4 Self-construction

The construction of Minqiang New Village follows strictly the principles of coordinated development of infrastructure, support functions and industrial development. In particular, there are "three supports." The first support is infrastructure facilities construction. The village planned to build three horizontal and three vertical road network with a total length of 2 km right outside the village. In addition, the village also will finish the supporting facilities of landscaping, water, heating, gas, and other facilities in one step. The second is function support. By

building kindergartens, medical service station, supermarket chains, property management center, the village intended to meet the villagers' basic service needs. The third support is industrial facilities construction. The village plans to build 3 primary industrial functional areas, namely, auto parts, building materials and decoration, and catering services, with a total construction area of 16,000 $m^2$. The goal is to let the industrial development drive population agglomeration. The village party committee is the main unit in charge of the construction. They intend to introduce very capable provincial construction engineering corporations through bidding to build the village. The village invested 1 million RMB Yuan to recruit 15 supervisors from Daqing Libo Supervision Company (with first level qualification) to monitor and supervise the building process. In addition, tt deployed 18 village cadres in two shifts to perform 24-h on-site supervision. Everyone has their own building numbers to supervise the supervisors, and monitor the quality of the projects. By collecting 80,000 yuan, the command center hired a technical representative to be responsible for the entire technical guidance, inspection, and control over various aspects. The village also set up a monitoring group consisting of ordinary people, village cadres, and retired personnel to ensure construction quality.

#### 3.3.2.5 Self-management

The management system is very villager friendly. The township party committee strives to achieve three goals, namely, the Minqiang New Village will allow the villagers to be able to move in, to afford the living, and to find employment opportunities. To achieve these goals, there are also so-called "three priorities." The first priority is to settle first. Based on the farmers' living habit and affordability, the village built three types of housing apartment styles with 65, 70, and 82 $m^2$ tailored to the needs of different households. The villagers can purchase needed style based on their own actual scenarios. Price-wise, for up to 70 $m^2$, the price is set at 1500 RMB Yuan per square meters, which is close to the building costs. Anything above 70 $m^2$ will be sold at 2100 RMB Yuan. In the meantime, to promote family piety, elder respecting, and societal harmony, for families with married sons living with parents, they will be eligible to obtain two apartments at the price of 1500 Yuan per square meter. For households with elders who are 70 and older, and who live with their children and grandchildren (grandchildren must be married), they are eligible to obtain three apartments at the price of 1500 RMB Yuan. If elders older than 70 didn't purchase an apartment, their sons and daughters can purchase apartment at a discounted price (discount is 300 RMB Yuan per square meter). For migrant workers whose living units were demolished, they can purchase an apartment at the price of 1600 RMB Yuan per square meter. The second priority is employment. The village party committee leads the initiative to sign contracts and labor agreement with companies of property management, urban management, housekeeping etc. that the locals will get the employment opportunities first so that farmers who want to work locally can. The third priority is advantageous treatment for locals. Local farmers who want to purchase commercial service buildings can have the priority of

choosing locations, and certain discount in prices. For relatively poor families, families with disabled individuals, and college students who initiate self-start-ups, the government will give them priority policies and funding support to fully support industrialization of the newly build township.

Via the above "five-self" led self-promoting mode, the example in Minqiang Village demonstrates that the villagers' living standards have been promoted, quality of life has been improved, and the village is progressively urbanizing. The example provides a strong policy signal that villager self-governing, democracy, and certain degree of autonomy is the fundamental precondition for progressive urbanization of the villages. Prevention and meditation are the effective means for urbanization. Sincere services are the foundation for success. Strong leadership is the guarantee for success.

### *3.3.3 Shareholding Mode for Gradual Urbanization*

With the shareholding mode for gradual urbanization, farmers can become shareholders of the cities based on actual development needs. Specifically, farmers can contract their lands as shares for urbanization. In the meantime, the grassland, woodland, water, and abandoned lands can be evaluated with certain prices. These properties will be managed by joint-stock companies. In so doing, farmers become shareholders. A balance point between urbanization and protecting the benefits of the farmers can be reached. Overall, using shareholding approaches to manage the village can protect the unique characteristics of the village, increase the farmers' income, and promote agricultural modernization.

In villages that are within the central city area, farmers have already integrated into the city, and shared various urban infrastructure and public service facilities with the urbanites. Their development shall be focused on modern services and industries. For example, in the urbanization process of Lamadian town in Ranghulu district, farmers will not only become a citizen, but also become shareholders. Famers will enjoy the so-called "five in one" security, namely, except for obtaining a relocation apartment, supported by governmental policy funds and land income, they will also get a rental property. The new citizens will also have pensions. Their unoccupied arable land can generate contract payments, and farmers working nearby can then receive a service fee. At the end of the year, the farmers can acquire dividends from the profitable town businesses. Apparently, after such shareholding reform, the farmers' living standards were greatly improved.

In the process of promoting shareholding mode urbanization, we need to actively mobilize the leading enterprises with strength, needs and radiating capability to participate in the constructions of the new village communities. The goal is to closely integrate community industrial development, employment, and enterprises demands for land to achieve integrated development and win–win between enterprises and new village communities. For instance, the Gufosi community in Changge city, Xuchang, Henan, is an exemplary illustration for such development.

The housing area in this community is about 190,000 $m^2$, and is in need of 160 million RMB Yuan for upgrading and construction. To raise fund for construction, the Gufosi community invested 690 mu lands to Henan Zhongpin Food Industry Co., Ltd. in exchange of 104 million RMB Yuan to construct the residential housing. The farmers then invest 10,000 RMB Yuan per household. For the invested lands, Zhongpin Food used part of them for building breeding bases and fruit and vegetable processing bases. The rest of the land was used to expand the company. Not only will the farmers who invested their lands obtain their shares, they can also work in the bases to increase their incomes. In so doing, the farmers and the enterprise achieve a win–win situation.

### *3.3.4 Homestead Replacement Mode for Gradual Urbanization*

The mode of urbanization focuses on replacing a small portion of homestead land with large area of agricultural land for urbanization purposes. Homesteads of neighboring villages can be combined together to build new village communities to attract population concentration. In the meantime, the previously scattered tools yard, vegetable bases, breeding fields, and agricultural products processing factories can all be concentrated to specific places to save land. Shixian Village of Erjin Town, Zhaozhou County implemented such a mode. In 2011, taking advantage of the opportunities of reconstructing mud huts and integrating urban and rural development, and learning from the reclamation areas' experiences, Shixian Village insisted on the principles of high standard planning, phased implementation, and high-quality construction for its gradual urbanization. With its original 12 natural villages, 1002 households (3811 people) and 23,000 mu arable lands, combining the neighboring Guanghui Village and Liming Village, Shixian Village replaced its 400 mu homestead for 3600 mu agricultural lands. For the next 5 years, Shixian Village plan to increase its population to 3000 households and 11,000 people, and extend its land to 68,000 mu. The new village plans a total land use of 50.5 ha with five functional zones, namely, residential zones, industrial parks, greenhouse parks, breeding parks, and agricultural trading zones. In the meantime, it will build supporting and service facilities such as recreation, fitness areas, health centers, supermarkets, bathing, schools, and kindergartens. In the overall design, villas and other high-end residential buildings account for about 10 %. In order to ensure smooth operation after the villagers moved in, Shixian Village also created very detailed plans for industrial development. In the farming sector, it will build seven parks for modern corn demonstration zone, greenhouse parks, and special economic activities. In the animal husbandry sector, it will build four standard breeding parks for cows, cattle, laying hens, and pigs. In the sector of enterprise-scale agro-processing, it will expand its timber processing plants and fruit and vegetable processing plants. In the sector of agricultural mechanization, it will build

farm machinery display area. In service industries sector, it will implement plans to increase employment opportunities for able-aged labors. Meanwhile, Shixian Village intended to introduce the advanced urban community management mode and market intensive management mode into their "villager autonomy under the party committee's guidance" management. The purpose is to ensure a comfortable living, cost-effective and orderly operation urbanization process. In so doing, Shixian Village will serve as a leading role model for new rural construction. The project started in mid-April 2011. The first phase was completed within that year, with four 6-story apartment building's main body finished. Building area was 22,700 $m^2$ with 240 household, and 60, 70, 80, and 90 $m^2$ four apartment styles. In the meantime, Shixian Village also built 32 garages with 35 $m^2$ and 32 business services areas with 40 $m^2$. Meanwhile, a two-story, 620 $m^2$ clinic building, 180 households barns, 220 m of extended fences, 16,000 $m^2$ community area with hardened Netherlands brick tiles were built in the same time. In the supporting facilities aspect, boiler room and relevant equipment to complete the heating power and water supply were built as well. 2.63 km underground sewage system, 1000 $m^3$ of biogas digesters and other large floor area ancillary facilities were also built to further accelerate Shixian Village's urbanization process. In Shixian Village's plans, it intended to use five years to sort out all the 3600 mu homestead of the 12 natural villages to make them achieve arable standards. In addition, the Village planned to use the 600 mu arable land to build 500 Greenhouses. The rest of the arable land will then be either rented out or put under the village's collective operation. If the income of those lands is 400 yuan per mu, the annual income could reach 1.28 million RMB Yuan. These funds will be used for building area and other management costs, reduce the burden on farmers.

At the community management model, drawing on the experience of urban community management, Shixian Village set up a building community management committee belonging to the village management committee to actively explore effective management mode for agricultural communities. The staffs are elected via open election. Each unit will elect one liaison, while each building generates an administrator. The administrators are members of the building community management committee. Office director and deputy directors of management committee will be elected from those administrators. The building community management committee will then set up sanitation team, security team, maintenance team, and cultural propaganda team. They will be responsible to determine the posts, quota, responsibility, and funds for each building. They are also responsible for health and sanitation management, water, electricity, gas, heat supply and maintenance, floor security, residential recreational places such as art and commercial business management, and industry and households management. The details will be determined according to "Property Management Regulations," and approved by the village committee. Their job will be preventing environment pollution, chaotic management, and floor and building security. On the aspect of distributing administrative costs, it shall follow the principle of "social welfare subsidy, village enterprises income subsidy, straw curing income, the appropriate charge among the residents." The ultimate goal is to ensure low-cost community living.

### *3.3.5 New Rural Communities Construction Mode for Gradual Urbanization*

The purposes of construction new rural communities for gradual urbanization in rural area is to expand the scale of rural settlements, optimize the layout of the village system, promote the process of urbanization in rural areas, promote rural land intensive management, initiate co-construction and sharing of village infrastructure, consolidate land resources, focus on building infrastructure, improve social, and municipal infrastructure utilization, and improve the quality of life of the people through construction of rural communities. In addition, constructing new rural communities can also narrow the gap of living standards between rural residents and urban residents, so that rural residents can gradually enjoy the same benefits as urban residents.

#### 3.3.5.1 Respect Public Opinion to Build the New Rural Communities, Meet the Conditions for Gradual Urbanization

Promoting gradual urbanization in the rural area must fully respect the wishes of the farmers and consider the farmers various production and living habits and different types of villages. The implementation need to be planned and orderly, and can be government-led, market-oriented combining with supporting policies. The general principles of building new rural communities shall follow "people-oriented, government-led, voluntary, rural self-built, industry support, sustainable development, features promoting, urban and rural integration, and quality enhancement." To initiate the new rural communities' construction, the areas must satisfy one of the following conditions:

1. The rural settlements have weak infrastructure, and are far away from the village centers. These types of rural settlements often have inadequate basic service facilities, and are often hard to access. Moving them into the central village to build new rural community can achieve infrastructure sharing and maximum utilization.
2. Rural settlements with less than 300 people. In order to meet the requirements of large-scale agriculture, mechanization, rural settlements that have less than 300 people shall be moved to the central village to build new rural communities.
3. Rural settlements that are located in the core area of the nature reserves. In accordance with the regulations of nature reserves, human activities are prohibited in their core areas. Under the premise of ecological protection, while in the same time respecting the farmers' production and living habits, we shall gradually guide the farmers who live in the core areas of natural reserves to migrate to the edge, and gradually gather them to the village center to build the new rural communities.

4. Rural settlements that are located in the immediate peripherals of city proper. For those settlements, they shall be gradually incorporated into the city proper to let the cities fully play their leading role urbanizing neighboring villages.
5. Rural settlements that are located in the urban planning zones and/or industrial parks. Based on the relevant requirements of urban planning, settlements that are within urban planning areas shall be all treated as urbanized areas and constructed as such.
6. Rural settlements whose lands have been contracted to large-scale plantation companies or individuals. In order to achieve large-scale production, we need to encourage farmers to release additional and idle land, and guide them to migrate to the center of the village to build new rural communities.
7. Rural settlements with mud houses and/or seriously damaged and easily demolished properties. Based on the people-oriented principles, we need to increase efforts to transform mud thatched cottage, improve the quality of farmers' living environment, and improve the rural environment.
8. Rural settlements with the lack of young labor forces. Many of the villagers who are left behind in those rural settlements are the old, weak, sick, and disabled. We need to guide these people to the surrounding villages to build new rural communities. The left land will then be sorted out the land for centralized management.
9. Rural settlements that are less than 1 km from the neighboring settlements with fairly large residential density. Though some villages do not really meet the other standards for merging, if they are less than 1 km from other villages, and with convenient transportation, it will be beneficial to merge such towns to build new rural communities.
10. Rural settlements that are located on the reservoir and other water conservation areas. To protect the water resources, these settlements need to be moved to other areas to build new rural communities.
11. Rural settlements that in a flood zone and was flooded over the 1998 flood. Settlements that were flooded by the 1998 flood and the ones that are in the flood plains often face constant threat of flooding. Moving them away to build new rural communities would reduce flood-induced property damage and life loses.
12. Rural settlements that are located within agricultural-forestry-pastoral-fishery field areas. With the development of market economy, the original settlements that are located in the field areas of agriculture, forestry, animal husbandry, and fisheries are no longer efficient and often fall behind the needs for modernization. In addition, residents there often face multiple administrative management problems, unreasonable identity system, and many other issues. It will be beneficial to dismantle these settlements, and bring them to new rural communities for unified management.
13. Rural settlements that are within prohibited areas. Apparently, since the areas are construction prohibited, all the natural villages within these areas shall be

moved out. Such areas include (but not limited to) geological disaster zones, flood storage areas, drinking water sources, ecology and nature reserves, scenic spots, underground mined area, subsidence area, historical relics and protected areas, transport and engineering pipeline protected areas, and the like.

14. A small portion of the remote villages, although they have reached the standard of moving and merging, but for convenience of production, and living habits, we need to retain the former administrative system.

#### 3.3.5.2 Advance Urbanization Based on Local Conditions and Different Classes, Highlighting the Characteristics of Local Areas

1. The basic principle of gradual urbanization is to respect local conditions, respect for public opinion and progress within the carrying capacity. Building new rural communities via relocating and merging rural settlements must respect the actual situations in rural areas. It must consider the living habits, local customs and other factors, respect the local conditions and farmers' wishes and choices, progress within the limits. An important note for promoting gradual urbanization is that we must not engage in coercion, formalism, and "one size fits all," instead we need to progress step by step, avoiding large-scale demolition, large-scale relocation, prevent petitions from the outset, and avoid instability and waste. In general, cities, farms, forests, towns, and central villages can all be the subject for moving and merging.
2. The implementation of gradual urbanization shall follow a general principle of "government organizations, policy support, and social participation." Building central village communities via relocating and merging settlements is often a task that requires strong policy-guidance. The task covers a wide range of issues, and involves the vital interests of farmers. It is crucial for rural areas' stability, development, and the overall well-being. Governments at various levels shall organize and implement such strategies with necessary supporting policies, and mobilize the farmers and other social forces to participate in the construction of new rural communities.
3. The implementation of the gradual urbanization model shall follow the order of "planning first, building later, and settlement first, demolition later." Planning for the new rural communities shall use the host plan as the technical guidance to generate the master plan for the new community. Combined with the transformation of mud thatched cottage in rural area and upgrading the shanty towns, we shall be able to scientifically and rationally select and determine sites for new, merged, and migrated centers of the villages or small town. In addition, the plans will also provide guidance for village infrastructures such as housing, water supply, drainage, roads, electricity, heating, communications, commerce,

health care, education, and other essential social services and village-based facilities construction, and gradually attract surrounding villagers voluntarily to move to the new rural communities or small towns.

4. The implementation shall follow a "step by step, from easy to difficult, phased implementation." Within the municipal area, the targets for merging and relocating should be settlements with a small population, and being small-scale, remote, backward, impoverished, disperse, lack of facilities, poor quality of housing, limited potential for further development, and far away from the center of town and the village. Through planning, research, advocacy, mobilization, site selection, relocation, compensation, and other administrative and economic measures, according to the principles of "the easier issues first, smaller issues then big ones, distant first then close ones," we shall focus first on merging and relocating natural villages that are small sized, impoverished and dispersed and located in the border and remote regions. In the meantime, we need to select the corresponding regional centers with relatively concentrated population, appropriate scale, high absorptive capacity, large carrying capacity, high development potential, and convenient conditions for farmers' production and living habits as the priority sites for building the new rural communities.
5. Implementation of gradual urbanization shall also focus on saving land, initiating timely reclamation, and intensive construction. During the process of relocating and building new rural communities, we need to timely reclaim the left over construction land from the moving-out villages, and convert them to arable land if possible. In so doing, we can exchange the reclaimed land for urban land use, hence both satisfying the goals of not reducing arable lands, and increase the land availability for urbanization.

#### 3.3.5.3 Building the New Rural Communities with High Standards to Provide Strong Support for the Gradual Urbanization

In the process of building new rural community, we must first work out a high standard new rural community construction quality plan. Based on the norms of construction standards (Table 3.3), we shall build characteristic industrial zones and adequate agricultural production facilities to form a relatively complete infrastructure and social utilities, create a clean and pleasant living environment, and protect the natural environment. Moreover, via building new sites with new modes, conducting local transformation, merging villages, changing villages to residential centers, reconstructing urban center villages, improving attractiveness of central towns, promoting industry-driven, and comprehensive land management, etc., we shall be able to accelerate the construction of new rural communities, and provide strong support for gradual urbanization.

**Table 3.3** Construction standards for new rural communities in the process of gradual urbanization

| Classes | Items | Construction standards |
|---|---|---|
| Community development scale | Community population size | More than 3000 people |
| | Construction land size | Recent construction land per capita in the community shall be no more than 150–180 $m^2$ |
| | Community living standard | The community per capita living area shall be over 40 $m^2$ |
| | Community economic growth | Community economic growth rate reaches 10 % and beyond |
| | Community residents' income | Growth rate for per capita net income of farmers in the community shall be more than 20 % |
| Community production facilities | Community industry implementation | Building characteristic industrial areas, and complete agricultural production facilities |
| | Community operating facilities | Community is in charge of doing business, operating farms, and promoting the service sectors |
| Community infrastructure | Community road construction | The main streets must have hard pavement |
| | Community energy facilities | Every home shall have power (100 %), clean energy penetration rate reaches 70 %. Main streets and branch roads must have public lighting system |
| | Community water supply facilities | Water supply coverage reaches 100 % |
| | Community drainage facilities | Centralized sewage treatment rate reaches 65 %. In the long run, rain water and raw sewage will be separated |
| | Community sanitation facilities | Concentrated stacking and handling of trash, and setting up trash cans over the community |
| | Community toilet facilities | Build one standardized public restroom. Household toilet harmless rate reaches 100 % |
| | Community cable TV | Cable television rate reaches 100 % |
| | Community network facilities | Broadband network and wireless network coverage reaches over 70 % |
| | Community telephone facilities | Every home will have telephone |
| | Community computer facilities | 70 % of the families shall have personal computers |

(continued)

**Table 3.3** (continued)

| Classes | Items | Construction standards |
|---|---|---|
| Community public facilities | Community education facilities | Setting up elementary schools, kindergartens, and nurseries |
| | Community medical facilities | Build a village clinics with more than 50 $m^2$ area; the new cooperative medical insurance coverage reaches 90 % |
| | Community cultural facilities | Build community cultural center, technology exhibition, radio station, library, and the so-called propaganda corridor |
| | Community business facilities | Build community food stores, grocery stores, and comprehensive community service centers |
| | Community stores | Build a community convenience store with more than 20 $m^2$ area |
| | Community recreation facilities | There must be at least one small garden/parkland or public green area in the community with no less than 500 $m^2$ area |
| | Community sports facilities | Community sports venues are over 1000 $m^2$ |
| Community ecological environment facilities | Community afforestation | Community forest coverage rate reaches 20 %, voluntary tree planting rate reaches 100 % |
| | Community greening | Community wooded roads and ditches reach a greening rate of 95 % |
| Community management facilities | Community residents committee | Establish community resident committee |
| | Community CPC party branch | Establish community CPC party branch |
| | Community board of trustees | Establish community institutions, corporate boards, and other relevant agencies |

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# Chapter 4
# Spatial Pattern of China's New Urbanization

The transformation and development of China's New Urbanization include two types of spatial organizational patterns. The first one is led by 20 urban agglomerations, situated in a "two-vertical, three-horizontal axes" networked system. This spatial pattern formed the macro spatial structure of China's New Urbanization as "axes link agglomerations, while agglomerations support axes." The second one is a coordinated pyramided hierarchical spatial pattern of large, medium and small sized cities. These two spatial patterns are mutually supplementary and supportive to promote China's New Urbanization. In addition, although urban agglomeration is the main manifestation for New Urbanization, it is not, and shall not be regarded as the only manifestation. The coordinated development between urban agglomeration and large, medium, small sized cities and small towns is at least equally important for a healthy and sustainable New Urbanization. Examples from around the world provide some exemplary guidance. For instance, in Germany, the spatial structure and organization of urbanization reaches equilibrium mainly because the sizes of all the cities are relatively the same. Since all the cities develop in a fairly balanced fashion, which prevents the occurrence of severe urban diseases. On the other hand, in French and United Kingdoms, the urban spatial structures are rather imbalanced with the co-existence of very large and very small cities. Since the population mainly concentrates in mega cities like Paris, London, the over-crowdedness induce sever urban diseases in those mega cities, such as traffic congestion, air pollution, environment degradation, etc. In the United States, there are both balanced and imbalanced structures forming massive freestyle regional urban spatial pattern. In Japan, due to limited available land, its urban spatial structure is characterized by high-density and compact pattern. Apparently, the difference among various countries' urban spatial pattern is vast due to different development paths, histories,



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population dynamics and natural resources and environment endowments. Experiences of urban spatial structure and pattern from other nations can provide exemplary lessons for optimizing the spatial structure and patterns of China's New Urbanization, but they shall never be copied. The ultimate goal for spatial structure and pattern of China's New Urbanization is relative balance, fair development, rational division of labor, appropriate size, and relative compactness.

## 4.1 Urban Agglomeration-Led "Axes Connect Agglomerations" Spatial Pattern

Urban agglomeration refers to a spatial format of urbanization which often centered on 1 mega city, with 3 or more metropolitan areas or large cities as the fundamental composing units. Within the urban agglomeration, there are often very developed transportation and telecommunication networks. The spatial organization is often compact; the economic connection often very close and cities within the agglomeration highly integrated. Urban agglomeration is the spatial format when industrialization and urbanization develop to relatively high stages, and is also the ultimate spatial organization of metropolitan development. Since the composing units within the agglomeration are often highly integrated together, they often share the so-called "ten-same" regardless of administrative boundaries, namely, same plan, same industrial chain, same integrated urban and rural development, same transportation network, same information sharing facilities, same financial services, same market, same promotion for science and technology, same strategies for environmental remediation and protection, same approaches to protect the ecology systems. The entire urban agglomeration becomes a highly integrated community of economic development and interest [1]. Specifically, there will be 10 communities based on the "ten-same," namely, planning community, economic community, urban and rural community, transportation community, information community, financial community, market community, innovation community, environmental protection community, and ecological protection community. From the perspective of high level integration, there are six grand integrations that shall be promoted in urban agglomeration, namely, integration of regional industrial development distribution, integration of infrastructure construction, integration of regional market construction, integration of urban and rural development and construction, integration of environmental protection and ecological reconstruction, and integration of social development and social security system construction.

### *4.1.1 Central Government Regards Urban Agglomeration as the Spatial Subject for New Urbanization for the First Time*

#### 4.1.1.1 Urban Agglomerations Are Effective Regional Units for China to Participate in Global Economic Competition and International Division of Labor in the Era of Globalization

It has long been recognized that the 21st century is the century of economic globalization. As the economic globalization and urbanization progresses further, competitions among cities are no longer one-to-one, instead more among groups/agglomerations of cities that are led by a central core city. For that matter, urban agglomerations led by a core large city have become a unique urban-regional development spatial organization mode with global significance. Development of urban agglomerations has profound impact on a nation's international competitiveness. With the strengthened integration of global economic development, it can be predicted that only urban agglomerations have adequate industrial clusters and economies of scale to participate global urban competition and collaboration. Only urban agglomerations can form strong joint economic and development community to face the challenges during globalization. As the United Nations predicted, there will be over 75 % of the global population will be living in the cities by 2050. In the meantime, the 40 largest super cities in the future will only occupy a very small portion of the Earth, but concentrate 18 % of the global population, contribute to 66 % of the global economic activities and around 85 % of the global technological innovation. The latest "World's Cities Report" points out that super metropolis around the world are gradually converging to even larger "super urban area" and "super city groups." Apparently, urban agglomeration will become the nation's brand new regional spatial units in the global competition and the international division of labor. It will decide the new world political and economic pattern in the 21st century [2].

#### 4.1.1.2 "National Main Functional Area Planning" Regards the Urban Agglomerations as Key Development and Optimization Zones

The State Council approved "National Main Functional Area Planning" for the first time divided China's national land spaces into four main functional areas, i.e., optimized development zone, key development zone, restricted development zone and prohibited development zone. Among them, optimized development zone refers to regions with highly developed density and weakening resources and environment carrying capacity. These zones are the main spatial units to lead the national socioeconomic development and global competition. Key development zone refers to regions with relatively strong resource and environmental carrying capacity and also strong economic development potential and population concentration.

These zones are the important carriers for national economic development and population concentration. Restricted development zone refers to regions with weak resource and environment carrying capacity and lacking appropriate conditions to accumulate economic activities and population, or regions that might impact on the ecological security if intensively development. Prohibited development zone refers to the various natural reserves. The proposal of the four main function zones indicates China's future socioeconomic development will have a clearer orientation; ecological and environmental protection have stronger constraints; and spatial management is more targeted. Checking through the spatial distribution of China's urban agglomerations, we can see that the majority of China's urban agglomerations are located within the key development and optimized development zones, which gives a strong signal that urban agglomerations take a very important, dominant position in China's national Main Functional Planning.

#### 4.1.1.3 The Central Working Conference of Urbanization for the First Time Proposes to Treat Urban Agglomerations as Primary Spatial Format to Promote New Urbanization

The Central Working Conference of Urbanization held in December, 2012 for the first time clearly proposed four major tasks for New Urbanization. The fourth task is to optimize the distribution and spatial organization of urbanization, and proposed for the first time to build urban agglomerations as the primary spatial organization for promoting New Urbanization. In the Conference, it was proposed to continue the optimization and construction of (Bei)Jing- (Tian)Jin-(Hebei)Ji, Yangtze Delta, Pearl River Delta urban agglomerations to enable their global competitiveness. In the meantime, it was also proposed to rely on marketization and national planning guidance to build a few urban agglomerations in the Central and Western, and Northeastern China to form important growth poles for Central and Western, and Northeastern China's development.

#### 4.1.1.4 For Ten Consecutive Years in Two "Five-Year-Plan," China Regards Urban Agglomerations as the Main Spatial Organizations for Promoting New Urbanization

In the National "Eleventh Five-Year Plan," it was clearly stated: "Urban agglomeration shall be the primary spatial organization to promote urbanization and gradually form a highly efficient, coordinated and sustainable urban spatial pattern with the two vertical axes, namely, the coastal areas and the Harbin-Beijing-Guangzhou railways, and the two horizontal axes, namely, the Yangtze River and Longhai railway, and a number of urban agglomerations linked with other cities and small townships, with permanent arable land and ecological function areas in between."

In the "Twelfth Five-Year Plan," it was further clarified that the New Urbanization shall improve regional development, actively and steadily promote

urbanization, adhere to the principles of urbanization with Chinese characteristics, scientifically design urbanization plan, and promote healthy urban development. In addition, in order to promote coordinated development among large, medium and small cities and townships, it is necessary to improve the urban layout and format, follow the principles of integrated planning, rational distribution, adequate functions, and large cities driving small ones, and the objective laws of urban development. The urban agglomerations will be gradually formed centered on large cities, but focusing on medium and small-sized cities to create radiating urban development clusters and centers. In the meantime, we need to scientifically plan and determine the functions and industrial distributions of the various cities within the agglomeration, aiming at alleviating pressures of the central city in mega cities, strengthening industrial functions of medium and small sized cities, improving public service and living functions for small townships, and promoting integrated construction and networked development of transportation, telecommunication, power supply, and water supply and discharge in large, medium and small cities [3].

#### 4.1.1.5 For Ten Consecutive Years in CCP's Seventeenth and Eighteenth Congress Reports, Urban Agglomerations Are Regarded as the New Growth Poles for China's Economy

The "Seventeenth Congress Report" issued in October, 2007 clearly pointed out: "We must follow an urbanization path with Chinese characteristics, focusing on increasing the comprehensive carrying capacity, relying on mega-cities to form urban agglomerations with strong radiating capability serving as the new growth poles for economic development."

In September, 2012, in the "Eighteenth Congress Report," it continued to propose that we need to continue to implement the overall regional development strategies, scientifically plan the scale and spatial layout of urban agglomerations, and strengthen the functions of industrial development, public services, employment opportunities, and population concentration. In the meantime, we need to accelerate the reform for household registration system, promote the urbanization of transferred agricultural population, and strive to achieve full coverage of urban basic public services.

#### 4.1.1.6 For Two Consecutive Years in 2012–2013, the Central Economic Work Conference Proposed Reasonable Layout of Urban Agglomerations

Following the proposal in the "Eleventh and Twelfth Five Year Plans" that urban agglomeration will be main spatial organization for promoting urbanization, in the Central Economic Work Conference in 2012, it is further proposed to scientifically guide the development of urban agglomeration based on the functional demarcation determined in the National Main Function Zone Planning. In December, 2013, the

next Central Economic Work Conference continued to propose that we must construct scientifically rational urban layout among large, medium and small cities and small town and the urban agglomeration. The layout and spatial pattern shall adjust to regional economic development and industrial distribution, and be within the resource and environmental carrying capacity.

#### 4.1.1.7 The "New National Urbanization Plan (2014–2020) also Proposed Urban Agglomeration as the Primary Spatial Organization for Promoting China's New Urbanization

On March 16, 2014, the CPC Central Committee State Council approved the implementation of the "New National Urbanization Plan (2014–2020)." In the Plan, it was proposed that people is the core of urbanization. We need then to orderly promote the urbanization of agricultural transferred population. Urban agglomeration is the primary spatial organization, and will facilitate the integrated development of large, medium, small sized cities and small townships. The comprehensive carrying capacity is the support to promote urban sustainable development. The system and institution innovation and reform are the guarantees to release the development potential of urbanization, and push for a people-oriented, "four modernizations" synchronized, spatial layout optimized, ecological system civilized, and cultural inherited Chinese characteristic urbanization route. Following the principles of comprehensive planning, rational distribution, collaborative division of labor, large cities driving small ones, we intend to develop urban agglomerations with high clustering efficiency, strong radiating capability, optimal urban system, and strong mutual supplementary functions. The urban agglomerations will then become significant platforms for supporting national economic growth, promoting regional coordinated development, and participating international competition and collaboration. Specifically, we need to optimized and enhance Beijing-Tianjin-Hebei, Yangtze River Delta, and Pearl River Delta urban agglomerations to build them to be global urban agglomerations. In the meantime, we shall invest to nurture Chengdu-Chongqing, Central Plain, Middle Reach of Yangtze River, and Hachang urban agglomerations in the central and western regions, so that they will become important growth poles to promote balanced land use development, and regional economic development. To successfully implement the plans, we need to establish urban agglomeration development coordination mechanism to coordinate the development and the implementation of urban agglomeration plans. The Central Government will be in charge of the planning and implementation of cross provincial urban agglomerations. The provincial governments will be in charge of the planning and implementation of urban agglomerations within their jurisdiction.

From the above narration, we can see that urban agglomerations will become the most active and promising core regions as China's urbanization and industrialization accelerates. Urban agglomerations will serve as the strategic supports, growth poles, and core nodes in the national distribution of productivity. They also serve

the concentrating and diffusing functions for various production factors at the national and regional level, controlling the lifeline of China's national economies. From incomplete statistics, in 2012, urban agglomerations accounted for 20 % of the national total land area, but concentrated 56 % of the population, 78 % of the economic outputs, 70 % of the fixed investment, 76 % of the societal consuming goods, 85 % of the college students, 92 % of the mobile phone users, 98 % of the foreign investment and 48 % of the food. They are apparently the most active and promising regions in China both today and in the future [4]. It is hence critical in the process of promoting New Urbanization that we must scientifically and rationally plan and build national, regional and local level urban agglomerations.

## *4.1.2 Main Issues Concerning China's Urban Agglomeration Selection*

### 4.1.2.1 The Position of Urban Agglomeration as the Primary Spatial Organization Has Been Over Exaggerated

It is true that urban agglomerations are the primary urban spatial organization for China's New Urbanization, which was constantly proposed in the above mentioned conferences, Reports and plans. It is also true that urban agglomerations belong to the optimized development and key development zones. The fact that urban agglomerations are the primary spatial organization of cities has been exaggerated in various local governments. As a matter of fact, some local governments even treat whether or not their jurisdiction was elected to be part of an urban agglomeration as a performance assessment and political task. Everyone attempts to "join the agglomeration" regardless of local conditions. Urban agglomeration was deemed the only way to promote New Urbanization and convert transferred farmers to urbanites. To some extreme, some even argue that "only urban agglomerations can promote New Urbanization." If a city was absorbed into an urban agglomeration, it will be treated as a victory. If not, it will induce a lot of complains. Such an exaggerated view of urban agglomerations will not only have no benefits to promote the healthy development of China's urban agglomerations, but also negatively impact on promoting China's New Urbanization.

### 4.1.2.2 The Spatial Extent of Urban Agglomerations Continues to Expand Without Limitation, Which Is in Direct Opposition to the Original Intention of Establishing Urban Agglomerations

From a theoretical perspective, the spatial extension of urban agglomerations often experienced four very long processes [5], namely, from city to metropolis, from

metropolis to metropolitan areas, from metropolitan areas to urban agglomerations, and from urban agglomerations to continued metropolitan belt. Like the old saying, "Rome was not built overnight," urban agglomerations were not formed overnight and can hardly be manipulated by human wills. Yet under the "agglomeration above all" mindset, some local governments, even news media and scholars greedily promote the spatial expansion of urban agglomeration. Such blind expansion often ignored the quality of urban agglomeration, violated the stage laws for urban agglomeration development, resulted in a typical "platter effect" that cities within the urban agglomeration were loosely connected with very limited collaboration and mutual support. Under such mindset, many provinces attempt to put all the cities into an urban agglomeration. As a consequence, the so-called "urban agglomeration" becomes a loosely connected urban group, directly violated the initial intention of establishing an urban agglomeration. The most obvious example is the so-called Middle Yangtze River Urban Agglomeration. Its spatial extent increased from the initial 25 cities in Hubei, Hunan and Jiangxi Provinces to 42 cities across Hubei, Hunan, Jiangxi and Anhui Provinces. The original "Central Triangle" turned to "Central Rectangle." Land area changed from 270,000 to 450,000 $km^2$, becoming the world's largest, yet weakest "urban agglomeration." Such a spatial organization is not really an urban agglomeration, but a "weirdo" from the beginning guided by the strong intention and mindset of "building an urban agglomeration for agglomeration's sake" [6]. Other examples such as in Shandong Peninsula urban agglomeration, which was extended from the well-recognized 8 cities to 13 cities. The Central Plain agglomeration was extended from the well-recognized 9 cities to 18 cities and then dropped to 9 cities again. As a result, such a blind extension created a series of artificial urban agglomeration belt in the Eastern Coastal regions and Yangtze River areas, which brings very little benefits to either promoting New Urbanization or local economic and social development. Under the background of strong government-oriented urban agglomeration constructions, the spatial extent of urban agglomeration becomes a container for various cities to "entering the platter" and "being taken care of." Many urban agglomerations extend their spatial extent even prior to building the agglomeration. Consequently, such "agglomerations" cannot even reach the lowest standard for urban agglomeration, let along any long term benefits of high density concentration and high efficiency [7].

#### 4.1.2.3 Selection of Urban Agglomerations Was Strongly Controlled (Led) by the Government While Ignoring the Most Basic Standards for Development

There are very basic standards for urban agglomerations' development. Specifically, there shall be no less than 3 metropolitan areas or mega-cities, and one of the mega-cities (super city) is the core city. The population size shall be no less than 20 million. Urbanization level shall be more than 50 %. Non-agriculture production values shall be over 70 %. Per capital GDP shall be over 10,000 US Dollars.

Economic density shall be more than 5 million RMB Yuan per square kilometer. Ratio of economic dependence on foreign trade shall be more than 30 %. Centralization rate of GDP in the core city shall be more than 45 %, and the core city shall have radiating capability across provinces. There shall be highly developed comprehensive transportation channels and economic circles based on transportation time (half an hour, an hour, and two hours). Only urban groups that meet the above seven basic standards can be called urban agglomeration [8]. From such a standard, we can see that the development process of urban agglomeration is a gradual, natural process. The urban agglomeration is supposed to be a highly integrated and highly efficient entity instead of an artificially pieced-together subject. Based on these standards, the so-called Central Triangle urban agglomeration which still attempts to extend its spatial extent has an urbanization level of only 37.6 % (less than the 50 % standard). Per capita GDP is only 4663 US Dollars (less than the 10,000 US Dollar standard). Ratio of economic dependence on foreign trade is only 2.72 % (much less than the 30 % level). Non-agricultural production value is only 64.7 % (less than the 70 % standard). Centralization rate of GDP in the core city is only 19.9 % (less than the 45 % standard). All these five indicators are below the basic standards.

Analyzing from the staging law of urban agglomeration development, the Middle Yangtze River urban agglomeration is currently in its infancy. There will be a very long, exploratory, trial and error process for it to become highly efficient and highly integrated. It must be firmly recognized that the Middle Yangtze River urban agglomeration is not "demarcated," but "nurtured" by the market mechanism, and "created" by the collaborations among cities. We must then fully recognize its long-term and arduous nature, avoid any haste and rush. We must follow the staging/phasing laws of urban agglomeration development, gradually nurture and sustainably support its development. In the meantime, for regions in the Central and Western China, specifically, Central Shanxi Area, Central Yunnan Area, Central Guizhou Area, Northern Slope of Tianshan Mountain Area, and Lanzhou-Baiyin-Xining Area, they do not have sufficient resources and socioeconomic development levels to be developed to full-fledged urban agglomerations. The can be called urban agglomeration, however, to both balance the regional development status and for future development.

#### 4.1.2.4 Selection of Urban Agglomeration Gives in Too Much to Local Interests, Affecting the Overall National Security Strategies

In selecting locations for urban agglomeration development, the Central and local governments are actually playing games and even trades. The State relies too much on the main functional areas, while on the same time is not willing to hurt the local initiatives. In such a game, urban agglomeration becomes the policy zone for State Urbanization, and was expected to absorb 75 % newly added urbanites.

For example, in the Middle Yangtze River urban agglomeration, demarcating the boundaries of the urban agglomeration over-considers local interests. For one thing,

the middle Yangtze River is a significant area for China's food production and agriculture modernization, and is responsible for national food security and survival security. In determining the spatial extent of this urban agglomeration, if deciding the boundaries considers too much the local governments' demands and requests hence includes too many cities (even cities that are not qualified) into the urban agglomeration, the direct impact will be a reduction of the national food production area and impact on national strategic security. For another, the Wuhan Urban Agglomeration and Changsha-Zhuzhou-Xiangtan Urban Agglomeration are the experimental zones for building the so-called "Two-Oriented society (resource-conserving oriented and environment-friendly oriented)." Poyang Lake Rim Urban Agglomeration is the illustrative zone for national comprehensive development of large lakes. These urban agglomerations shoulder the historical mission of building and illustrating a resource-conserving and environment-friendly society. From the perspective of ecological civilization and Beautiful China, the development and construction of the Middle Reaches Triangle Urban Agglomeration shall put the overall national resource security and ecological security as top priority. Artificially extend the urban agglomerations' spatial extent occupied spaces for food production space and ecological security space. In addition, naming of the urban agglomeration shall avoid using just one city's name or some other groundless names. Instead, the common physic geographic feature's name can be better choices.

#### 4.1.2.5 Confusing Urban Agglomeration with Town Agglomeration While the Two Are Essentially Different

Urban agglomeration and town agglomeration look very similar, yet their spatial extent, scale, economic activities and interconnectedness, etc., are fairly different.

From the perspective of development scale, there are very strict standards as aforementioned in terms of population and economy sizes. They must reach certain level to be considered urban agglomeration. For town agglomeration, however, there are no such standards. Technically speaking, while three towns are clustered together with certain economic and technological connection, we will consider them to be a town agglomeration. From the perspective of agglomeration structures, urban agglomeration must contain a hierarchical urban system with large, medium and small cities and small towns, while town agglomeration contains only small towns. From the perspective of numbers, as the spatial radiating extent of urban agglomeration increases, the numbers of urban agglomeration will decrease. Boundaries between different urban agglomerations will become blurred and might eventually merge into on gigantic national urban agglomeration. On the other hand, as the trends of regional economic integration and urban rural development integration are strengthening, there will be more town agglomerations in the process. From the perspective of competitiveness, the urban agglomerations are designed to have strong domestic and international competitiveness, and are the growth poles of national economy. Town agglomerations, however, concentrate on regional level

competition. Apparently, urban agglomerations contain town agglomerations. From the spatial distribution perspective, urban agglomerations exist in some major provincial units where conditions permit. Town agglomerations exist almost everywhere as long as there are townships. A good example is in Tibet, in the foreseeable future, it might be very hard to establish a full-fledged urban agglomeration in Tibet due to its limited conditions, but there can be numerous town agglomerations. From the development perspective, however, urban agglomeration and town agglomeration will become two important spatial organizations that promote China's New Urbanization. With this in mind, we must be very clear in selecting urban agglomerations the difference between the two. In some of the official documents, scholarly research, and project designs, the two were often confused.

#### 4.1.2.6 The Argument "Let Urban Agglomeration no Longer Be a Group of Cities" Is Very Misleading While Forming and Developing Urban Agglomerations

First and foremost, we must admit that urban agglomeration is indeed a group of cities. They are just a group of cities that meet certain criteria. If we miss this point, ignoring that urban agglomeration is essentially the concentration and grouping of like and hierarchical cities, we cannot even discuss urban agglomeration to start with. Only when there are sufficient amount of cities that meet the seven standards aforementioned, can we really devise strategies and plans to develop urban agglomeration and integration of the cities within. The argument "let urban agglomeration no longer be a group of cities" misinterpreted the fundamental conditions for urban agglomeration development hence misled the formation and development of urban agglomeration. Only when we admit that urban agglomeration is a group of cities, can we then further discuss how to realize the integration of industrial development and layout, infrastructure construction integration, and urban and rural integration. And only then we can really ensure that urban agglomeration is the economic, interest and fate community of all the cities within for mutual benefit and win-win.

#### 4.1.2.7 Urban Agglomerations Become Sensitive and Key Treatment Areas of for Haze and Other Focused and Intensified Environmental Problems

Under the background and context of past long term extensive mode of economic development in China, on the one hand, the urban agglomeration areas will be the most dynamic and potential areas for regional economic development in China in both now and the future. On the other hand, urban agglomerations are also highly sensitive areas with highly concentrated ecological and environmental problems. According to incomplete statistics, the total industrial wastewater discharge,

industrial waste gas emissions and industrial solid waste generation volume in China's urban agglomerations accounted for 67 % or more of the total amounts. Apparently, although the urban agglomerations gathered more than three-quarters of economic outputs of China, but at the same time it also produced around three quarters of pollution outputs. As of right now, the national large-scale spread of haze pollution covering the eastern coastal regions and all urban agglomerations in Northeast China, which fully reflects the fact that the environmental pollution problems have become increasingly prominent in urban agglomeration areas.

For this matter, there is hence an urgent need for China to devise plans to guide the development of urban agglomerations and their industrial development and spatial restructuring based on national main function areas, scientific measurement of the ecological carrying capacity with the urban agglomerations, and permitted ecological and environmental thresholds [9]. Therefore, we must study the dynamic mechanisms for industrial clustering and spatial extension and the ecological support effect for urban agglomerations. The urban agglomeration areas must be the key regions of China's comprehensive pollution treatment and ecological construction to ensure economic development and environmental protection within urban agglomerations are planned, constructed, and implemented simultaneously. This is crucial to promote sound, rapid and healthy development of China's urban agglomerations. It also has practical significance to improve the ecological environment in urban agglomeration areas, and to build resource-saving and environment-friendly urban agglomerations.

### *4.1.3 The "5 + 9 + 6" Urban Agglomeration Spatial Pattern*

Focusing on the strategic positioning of urban agglomerations and the outstanding issues during urban agglomeration development, we intend to develop the urban agglomerations into national and global industrial clustering regions and advanced manufacturing bases. They will also be the strategic key and core areas for China's economic development, illustrative zones for various sustainable development and scientific development modes, and open cooperation and pilot zones. Via analyzing the corresponding coordinated relationships between urban agglomeration layout and the national main function area planning, national urban system planning, combining with the "15 + 8" proposal of demarcating China's urban agglomerations by the Chinese Academy of Sciences and other relevant proposals, we propose a new urban agglomeration spatial structure that coordinates between national main functional areas and national urban system. The grand spatial structure can be concisely described as a "5 + 9 + 6" structure, namely, 5 national level urban agglomerations, 9 regional level urban agglomerations and 6 sub-regional level urban agglomerations (Figs. 4.1, 4.2 and Table 4.1).

From Table 4.1, we can see that China's urban agglomerations contain 422 large, medium and small-sized cities, accounting for 63.94 % of all the cities in China. Among them, 4 are provincial level municipalities; 191 are prefecture-level

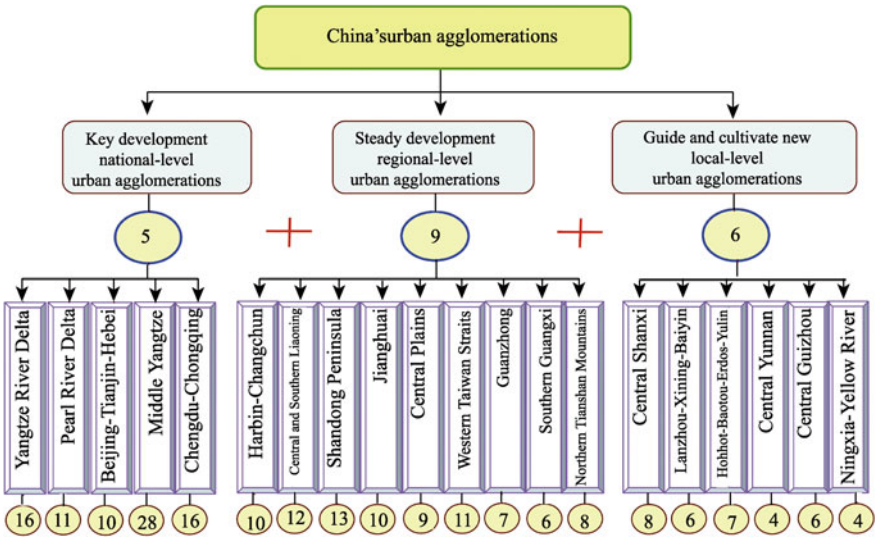


**Fig. 4.1** Policy classification and guidance of China's urban agglomerations


**Fig. 4.2** New spatial pattern of "5 + 9 + 6" in the future construction of china's urban

**Table 4.1** The basic framework of China's urban agglomerations policy classification and new spatial structure

| ID | Policy classification | Urban agglomeration | Spatial extent | Number of prefecture-level cities | Number of cities | Number of townships |
|---|---|---|---|---|---|---|
| 1 | Focused national level urban agglomerations (5) | The Yangtze River Delta urban agglomeration | Shanghai, Nanjing, Wuxi, Changzhou, Suzhou, Nantong, Yangzhou, Zhenjiang, Taizhou, Hangzhou, Ningbo, Jiaxing, Huzhou, Shaoxing, Zhoushan, Taizhou | 16 | 51 | 1027 |
| 2 | | Pearl River Delta urban agglomeration | Guangzhou, Shenzhen, Zhuhai, Foshan, Jiangmen, Zhaoqing, Huizhou, Dongguan, Zhongshan, Hong Kong and Macao special administrative regions | 11 | 17 | 335 |
| 3 | | Beijing-Tianjin-Hebei urban agglomeration | Beijing, Tianjin, Tangshan, Langfang, Baoding, Qinhuangdao, Shijiazhuang, Cangzhou, Chengde, Zhangjiakou | 10 | 27 | 1009 |
| 4 | | Middle Yangtze River urban agglomeration | Wuhan, Huangshi, Ezhou, Xiaogan, Huanggang, Xianning, Xiantao, Qianjiang, Tianmen, Changsha, Zhuzhou, Xiangtan, Hengyang, Yueyang, Yiyang, Changde, Loudi, Nanchang, Jiujiang, Jingdezhen, Yingtan, Xinyu, Fuzhou, Yichun, Pingxiang, Yichang, Jingzhou, Jingmen | 28 | 61 | 1586 |
| 5 | | Chengdu-Chongqing urban agglomeration | Chongqing (including Wanzhou, Fuling, Yuzhong, Dadukou, Jiangbei, Shapingba, Jiulongpo, Nan'an, Beibei, Wansheng, Yubei, Banan, Changshou, Jiangjin, Hechuan, Yongchuan, Nanchuan, Shuangqiao, Qijiang, Tongnan, Tongliang, Dazu, Rongchang, Bishan, Liangping, Fengdu, Dianjiang, Zhongxian, Kaixian, Yunyang, Shizhu), Chengdu, Deyang, Mianyang, Meishan, Ziyang, Suining, Leshan, | 16 | 33 | 2108 |

(continued)

**Table 4.1** (continued)

| ID | Policy classification | Urban agglomeration | Spatial extent | Number of prefecture-level cities | Number of cities | Number of townships |
|---|---|---|---|---|---|---|
| | | | Ya'an, Zigong, Luzhou, Neijiang, Nanchong, Yibin, Dazhou and Guang'an | | | |
| 6 | Steadily promoted regional urban agglomerations (9) | Southern and Central Liaoning urban agglomeration | Shenyang, Dalian, Dandong, Jinzhou, Yingkou, Panjin, Huludao, Anshan, Fushun, Benxi, Liaoyang, Tieling | 12 | 27 | 489 |
| 7 | | Shandong Peninsula urban agglomeration | Jinan, Qingdao, Yantai, Weihai, Rizhao, Dongying, Weifang, Zibo, Tai'an, Laiwu, Binzhou, Dezhou, Liaocheng | 13 | 40 | 740 |
| 8 | Teadily promoted regional urban agglomerations (9) | West of the Taiwan straight urban agglomeration | Fuzhou, Xiamen, Quanzhou, Wenzhou, Shantou, Zhangzhou, Putian, Ningde, Chaozhou, Jieyang, Shanwei | 11 | 23 | 931 |
| 9 | | Harbin-Changchun urban agglomeration | Harbin, Daqing, Qiqihar, Suihua, Mudanjiang, Changchun, Jilin, Songyuan, Siping, Liaoyuan | 10 | 30 | 547 |
| 10 | | Central plain urban agglomeration | Zhengzhou, Luoyang, Kaifeng, Xinxiang, Jiaozuo, Xuchang, Jiyuan, Pingdingshan, Luohe | 9 | 23 | 413 |
| 11 | | Jianghuai urban agglomeration | Hefei, Wuhu, Bengbu, Huainan, Anqing, Chizhou, Tongling, Ma'anshan, Chuzhou, Xuancheng | 10 | 14 | 413 |
| 12 | | Central Shaaxi urban agglomeration | Xi'an, Xianyang, Baoji, Tongchuan, Weinan, Shangluo, Tianshui | 7 | 10 | 518 |
| 13 | | Southern Guangxi urban agglomeration | Nanning, Beihai, Fangchenggang, Qinzhou, Yulin, Chongzuo | 6 | 9 | 308 |
| 14 | | North Slope of Tianshan Mountains | Urumqi, Shihezi, Changji, Fukang, Kuitun, Wusu, Wujiaqu, Karamay | 2 | 8 | 19 |

(continued)

**Table 4.1** (continued)

| ID | Policy classification | Urban agglomeration | Spatial extent | Number of prefecture-level cities | Number of cities | Number of townships |
|---|---|---|---|---|---|---|
| 15 | Guided, nurtured urban agglomerations (6) | Central Shanxi | Taiyuan, Jinzhong, Yangquan, Xinzhou, Linfen, Changzhi, Fenyang, Xiaoyi | 6 | 14 | 267 |
| 16 | | Hohhot-Baotou-Erdos-Yulin urban agglomeration | Hohhot, Baotou, Ordos, Wulanchabu, Bayannao'er, Wuhai, Yulin | 7 | 8 | 312 |
| 17 | | Central Yunnan urban agglomeration | Kunming, Qujing, Yuxi, Chuxiong | 4 | 6 | 218 |
| 18 | | Central Guizhou urban agglomeration | Guiyang, Zunyi, Anshun, Bijie, Kaili, Duyun | 4 | 9 | 284 |
| 19 | | Lanzhou-Xining-Baiyin urban agglomeration | Lanzhou, Baiyin, Xining, Haidong, Dingxi, Linxia city | 5 | 6 | 182 |
| 20 | | Ningxia-Yellow River urban agglomeration | Yinchuan, Wuzhong, Shizuishan, Zhongwei | 4 | 6 | 81 |
| Total urban agglomerations | 20 | 191 | 191 | 422 | 11,787 | |
| National total | 20 | | 288 | 660 | 19,410 | |

cities (66.32 % of all the prefecture-level cities in China); and 231 count-level cities (62.77 % of all the county-level cities in China). In addition, it also contains 1,1787 small townships, accounting for 60.73 % of all the small townships in China.

In 2010, total population in China's urban agglomerations accounted for 62.83 % of China's total. Urban build-up areas (city proper) accounted for 67.05 % of China's total. GDP accounted for 80.57 %. Among GDP, the added value of the primary industry accounted for 59.88 %; of the secondary industry accounted for 95.29 %, and of the tertiary industry accounted for 86.14 %. Total fixed asset investment accounted for 76.87 %. The actually utilized foreign investment accounted for 87.24 %. In a nutshell, the production factors within the urban agglomerations are dynamically concentrating (Table 4.2).

#### 4.1.3.1 Focus on Building the Five Major National Level Urban Agglomerations

With national central cities as the core, we shall focus on building the five national level urban agglomerations with international competitiveness and influence to drive national economic development. In the process, we shall promote the international service and innovation capability of the core cities, enhance their domestic and international radiation influence, strengthen coordinated division of labor among cities within the agglomeration, optimize the industrial structure and regional development structure, stress on regional ecological protection and environmental reconstruction, strictly control the intensity and density of development within the agglomerations, strengthen urban network (information highway) and infrastructure construction, and innovate management mechanisms for urban agglomeration. Currently, the national level urban agglomerations account for 9.06 % of national land area, with 31.39 % of the total population, 35.15 % constructed area, 43.83 % of all the urban population, 46.48 % GDP, 39.11 % societal fixed asset investment, and 57.58 % actual utilization of foreign investment (Tables 4.3, 4.4 and 4.5).

1. Yangtze River Delta Urban Agglomeration: integrated most competitive world-class urban agglomeration. This urban agglomeration includes 16 cities, namely, Shanghai, Nanjing, Jiangsu Province, Wuxi, Changzhou, Suzhou, Nantong, Yangzhou, Zhenjiang, Taizhou and Hangzhou, Zhejiang Province, Ningbo, Jiaxing, Huzhou, Shaoxing, Zhoushan, Taizhou. It belongs to the key urbanization region in the national main functional areas planning, i.e., the Yangtze River Delta region and key town agglomerations in the Yangtze River Delta's urban system planning. Land area is 109,900 $km^2$, accounting for 1.14 % of total land area in 2010. The urban construction land area (built-up area) accounting for 9.34 % of China's total. Total population accounted for 6.33 % of the total population in China. Urban population accounted for 12.28 % of the country. Economy output accounted for 16.17 % of the country. The actual utilization of foreign investment accounted for 24.27 % of the

**Table 4.2** Comparison of the main indicators of China's urban agglomerations

| | Name | Total area/km$^2$ | Urban build-up area/km$^2$ | Total population/ 10,000 | Urban population/ 10,000 | GDP/current price, 100 million RMB Yuan | Added value of the primary industry/100 million RMB Yuan | Added value of the secondary industry/100 million RMB Yuan | Added value of the tertiary industry/100 million RMB Yuan | Socictal fixed asset investment/ 100 million RMB Yuan | Actual utilization of foreign investment/100 million US Dollars |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | The Yangtze River delta urban agglomeration | 109,915 | 3714.34 | 8490.76 | 5646.50 | 70675.32 | 2307.14 | 35,960.95 | 32,404.47 | 33,460.38 | 464.13 |
| 2 | Pearl River Delta urban agglomeration | 55,240 | 2615.00 | 3016.15 | 2166.47 | 37,673.28 | 811.10 | 18,315.50 | 18,550.07 | 11,355.93 | 185.13 |
| 3 | Beijing-Tianjin-Hebei urban agglomeration | 182,501 | 3019.45 | 8445.67 | 5107.54 | 39,598.61 | 2194.52 | 16,614.71 | 20,789.82 | 23,618.61 | 201.96 |
| 4 | Middle Yangtze River urban agglomeration | 281,913 | 2539.33 | 11321.28 | 4112.89 | 31,999.22 | 3603.64 | 16,326.12 | 12,070.05 | 22,418.22 | 129.70 |
| 5 | Chengdu-Chongqing urban agglomeration | 240,394 | 2101.08 | 10,819.63 | 3114.40 | 23,202.14 | 2751.09 | 12,131.40 | 8319.64 | 17,909.86 | 120.28 |
| 6 | Southern and Central Liaoning urban agglomeration | 117,114 | 1699.30 | 3720.05 | 1965.89 | 19,615.59 | 1438.93 | 10,442.24 | 7734.41 | 15,146.15 | 205.30 |
| 7 | Shandong Peninsula urban agglomeration | 112,741 | 1968.48 | 6270.73 | 2902.56 | 32,652.29 | 2425.24 | 17,911.18 | 12,315.77 | 19,109.63 | 82.35 |
| 8 | West of the Taiwan straight urban agglomeration | 83,631 | 1206.00 | 5229.22 | 2066.35 | 17,935.95 | 1304.05 | 9330.16 | 7301.30 | 11,988.15 | 63.53 |
| 9 | Harbin-Changchun urban agglomeration | 280,252 | 1505.01 | 4643.64 | 1942.91 | 16365.99 | 1981.90 | 8359.46 | 6024.21 | 10960.92 | 47.87 |
| 10 | Central Plain urban agglomeration | 58,840 | 1048.00 | 4549.12 | 1377.91 | 13375.37 | 1157.18 | 8114.36 | 4103.56 | 9310.96 | 46.23 |
| 11 | Jianghuai urban agglomeration | 71,125 | 1004.00 | 3039.02 | 953.46 | 8838.66 | 825.10 | 5026.46 | 2987.05 | 8940.47 | 42.92 |
| 12 | Central Shaaxi urban agglomeration | 89,102 | 674.00 | 2940.97 | 941.67 | 6891.55 | 708.90 | 3339.28 | 2843.49 | 6531.43 | 18.00 |

(continued)

**Table 4.2** (continued)

| | Name | Total area/km$^2$ | Urban build-up area/km$^2$ | Total population/ 10,000 | Urban population/ 10,000 | GDP/current price, 100 million RMB Yuan | Added value of the primary industry/100 million RMB Yuan | Added value of the secondary industry/100 million RMB Yuan | Added value of the tertiary industry/100 million RMB Yuan | Socictal fixed asset investment/ 100 million RMB Yuan | Actual utilization of foreign investment/100 million US Dollars |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 13 | Southern Guangxi urban agglomeration | 72,738 | 462.66 | 2271.04 | 417.15 | 4271.54 | 798.23 | 1720.56 | 1752.71 | 3721.12 | 7.08 |
| 14 | North Slope of Tianshan Mountains | 59,496.6 | 562.50 | 417.32 | 319.66 | 2442.24 | 84.30 | 1430.25 | 926.15 | 1009.67 | 1.57 |
| 15 | Central Shanxi | 89,334.3 | 491.50 | 1982.85 | 796.41 | 5562.56 | 272.91 | 2989.72 | 2299.87 | 3363.74 | 6.17 |
| 16 | Hohhot-Baotou-Erdos-Yulin urban agglomeration | 295,981 | 650.00 | 1492.60 | 574.90 | 10288.47 | 537.62 | 5684.50 | 4066.36 | 6764.40 | 31.91 |
| 17 | Central Yunnan urban agglomeration | 95,980 | 427.58 | 2067.39 | 557.01 | 4267.14 | 464.22 | 2117.31 | 1685.60 | 3467.59 | 10.63 |
| 18 | Central Guizhou urban agglomeration | 55063.7 | 319.00 | 1647.31 | 426.44 | 2538.46 | 274.28 | 1024.37 | 1239.53 | 1824.85 | 2.62 |
| 19 | Lanzhou-Xining-Baiy in urban agglomeration | 75,365 | 355.66 | 1395.63 | 425.06 | 2475.56 | 203.48 | 1159.13 | 1112.89 | 1560.22 | 0.45 |
| 20 | Ningxia-Yellow River urban agglomeration | 52,170 | 295.00 | 490.09 | 229.80 | 1458.23 | 129.33 | 753.48 | 575.39 | 1317.56 | 0.55 |
| Urban agglomeration total | | 2,478,897 | 26,657.89 | 84,250.47 | 36,044.98 | 35,2128.17 | 24,273.18 | 178,751.14 | 149,102.34 | 213,779.87 | 1668.39 |
| National total | | 9,600,000 | 39,758.40 | 134,091.00 | 45,964.00 | 437,041.99 | 40,533.60 | 187,581.40 | 173,087.00 | 278,121.90 | 1912.35 |
| Percentage of urban agglomeration | | 25.82 | 67.05 | 62.83 | 78.42 | 80.57 | 59.88 | 95.29 | 86.14 | 76.87 | 87.24 |

**Table 4.3** Main indicators for various urban agglomerations in China (2010)

| Level of urban agglomerations | Total area/km$^2$ | Urban build-up area/km$^2$ | Total population/ 10,000 | Urban population/ 10,000 | GDP/current price, 100 million RMB Yuan | Added value of the primary industry/100 million RMB Yuan | Added value of the secondary industry/100 million RMB Yuan | Added value of the tertiary industry/100 million RMB Yuan | Societal fixed asset investment/ 100 million RMB Yuan | Actual utilization of foreign investment/100 million US Dollars |
|---|---|---|---|---|---|---|---|---|---|---|
| National level | 869,963 | 13,989.2 | 42,093.49 | 20147.8 | 203148.57 | 11,667.49 | 99,348.68 | 92,134.05 | 108,763 | 1101.2 |
| Regional level | 945,039.6 | 10,129.95 | 33,081.11 | 12887.56 | 122,389.18 | 10,723.83 | 65,673.95 | 45,988.65 | 86,718.5 | 514.85 |
| Sub-regional level | 663,894 | 2538.74 | 9075.87 | 3009.62 | 26,590.42 | 1881.84 | 13,728.51 | 10,979.64 | 18,298.36 | 52.33 |
| Total | 2,478,897 | 26,657.89 | 84,250.47 | 36044.98 | 352,128.17 | 24,273.18 | 178,751.14 | 149,102.34 | 213,779.87 | 1668.39 |

**Table 4.4** Main indicators of China's urban agglomeration and their positions (2010)

| Urban agglomerations | | Total area/km$^2$ | an urban build-up area/km$^2$ | Total population/ 10,000 | Urban population/ 10,000 | GDP/current price, 100 million RMB Yuan | Added value of the primary industry/100 million RMB Yuan | Added value of the secondary industry/ 100 million RMB Yuan | Added value of the tertiary industry/ 100 million RMB Yuan | Societal fixed asset investment/100 million RMB Yuan | Actual utilization of foreign investment/ 100 million US Dollars |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Percentage within urban agglomerations | National level | 35.09 | 52.48 | 49.96 | 55.90 | 57.69 | 48.07 | 55.58 | 61.79 | 50.88 | 66.00 |
| | Regional level | 38.12 | 38.00 | 39.27 | 35.75 | 34.76 | 44.18 | 36.74 | 30.84 | 40.56 | 30.86 |
| | Sub-regional level | 26.78 | 9.52 | 10.77 | 8.35 | 7.55 | 7.75 | 7.68 | 7.36 | 8.56 | 3.14 |
| Percentage in China | National level | 9.06 | 35.19 | 31.39 | 43.83 | 46.48 | 28.78 | 52.96 | 53.23 | 39.11 | 57.58 |
| | Regional level | 9.84 | 25.48 | 24.67 | 28.04 | 28.00 | 26.46 | 35.01 | 26.57 | 31.18 | 26.92 |
| | Sub-regional level | 6.92 | 6.39 | 6.77 | 6.55 | 6.08 | 4.64 | 7.32 | 6.34 | 6.58 | 2.74 |

**Table 4.5** China's urban agglomerations and their position in China (2010)

| Order | Name | Total area/% | Urban build-up area/% | Total population/% | Urban population/% | GDP/% | Added value of the primary industry/% | Added value of the secondary industry/% | Added value of the tertiary industry/% | Societal fixed asset investment/% | Actual utilization of foreign invesiment/% |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | The yangtze River Delta urban agglomeration | 1.14 | 9.34 | 6.33 | 12.28 | 16.17 | 5.69 | 19.17 | 18.72 | 12.03 | 24.27 |
| 2 | Pearl River Delta urban agglomeration | 0.58 | 6.58 | 2.25 | 4.71 | 8.62 | 2.00 | 9.76 | 10.72 | 4.08 | 9.68 |
| 3 | Beijing-Tianjin-Hebei urban agglomeration | 1.90 | 7.59 | 6.30 | 11.11 | 9.06 | 5.41 | 8.86 | 12.01 | 8.49 | 10.56 |
| 4 | Middle yangtze River urban agglomeration | 2.94 | 6.39 | 8.44 | 8.95 | 7.32 | 8.89 | 8.70 | 6.97 | 8.06 | 6.78 |
| 5 | Chengdu-Chongqing urban agglomeration | 2.50 | 5.28 | 8.07 | 6.78 | 5.31 | 6.79 | 6.47 | 4.81 | 6.44 | 6.29 |
| 6 | Southern and Central Liaoning urban agglomeration | 1.22 | 4.27 | 2.77 | 4.28 | 4.49 | 3.55 | 5.57 | 4.47 | 5.45 | 10.74 |
| 7 | Shandong Peninsula urban agglomeration | 1.17 | 4.95 | 4.68 | 6.31 | 7.47 | 5.98 | 9.55 | 7.12 | 6.87 | 4.31 |
| 8 | West of the Taiwan straight urban agglomeration | 0.87 | 3.03 | 3.90 | 4.50 | 4.10 | 3.22 | 4.97 | 4.22 | 4.31 | 3.32 |
| 9 | Harbin-Changchun urban agglomeration | 2.92 | 3.79 | 3.46 | 4.23 | 3.74 | 4.89 | 4.46 | 3.48 | 3.94 | 2.50 |
| 10 | Central Plain urban agglomeration | 0.61 | 2.64 | 3.39 | 3.00 | 3.06 | 2.85 | 4.33 | 2.37 | 3.35 | 2.42 |

(continued)

**Table 4.5** (continued)

| Order | Name | Total area/% | Urban build-up area/% | Total population/% | Urban population/% | GDP/% | Added value of the primary industry/% | Added value of the secondary industry/% | Added value of the tertiary industry/% | Societal fixed asset investment/% | Actual utilization of foreign invesiment/% |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 11 | Jianghuai urban agglomeration | 0.74 | 2.53 | 2.27 | 2.07 | 2.02 | 2.04 | 2.68 | 1.73 | 3.21 | 2.24 |
| 12 | Central Shaaxi urban agglomeration | 0.93 | 1.70 | 2.19 | 2.05 | 1.58 | 1.75 | 1.78 | 1.64 | 2.05 | 0.94 |
| 13 | Southern Guangxi urban agglomeration | 0.76 | 1.16 | 1.69 | 0.91 | 0.98 | 1.97 | 0.92 | 1.01 | 1.34 | 0.37 |
| 14 | North Slope of Tianshan Mountains | 0.62 | 1.41 | 0.31 | 0.70 | 0.56 | 0.21 | 0.76 | 0.54 | 0.36 | 0.08 |
| 15 | Central Shanxi | 0.93 | 1.24 | 1.48 | 1.73 | 1.27 | 0.67 | 1.59 | 1.33 | 1.21 | 0.32 |
| 16 | Hohhot-Baotou-Erdos-Yulin urban agglomeration | 3.08 | 1.63 | 1.11 | 1.25 | 2.35 | 1.33 | 3.03 | 2.35 | 2.43 | 1.67 |
| 17 | Central Yunnan urban agglomeration | 1.00 | 1.08 | 1.54 | 1.21 | 0.98 | 1.15 | 1.13 | 0.97 | 1.25 | 0.56 |
| 18 | Central Guizhou urban agglomeration | 0.57 | 0.80 | 1.23 | 0.93 | 0.58 | 0.68 | 0.55 | 0.72 | 0.66 | 0.14 |
| 19 | Lanzhou-Xining-Baiyin urban agglomeration | 0.79 | 0.89 | 1.04 | 0.92 | 0.57 | 0.50 | 0.62 | 0.64 | 0.56 | 0.02 |
| 20 | Ningxia-Yellow River urban agglomeration | 0.54 | 0.74 | 0.37 | 0.50 | 0.33 | 0.32 | 0.40 | 0.33 | 0.47 | 0.03 |
| Total/% | 25.82 | 67.05 | 62.83 | 78.42 | 80.57 | 59.88 | 95.29 | 86.14 | 76.87 | 87.24 | |

country. This urban agglomeration has two national central cities, namely, Shanghai and Nanjing at its core. Yangtze River Delta Urban Agglomeration is the strongest and most comprehensive economic center in China. It is also an important international gateway to the Asia-Pacific region; one of the world's major advanced manufacturing bases, the first urban agglomeration that achieved world class level. It will be built into China's largest and most international competitiveness economic center. In the meantime, it will take advantage of accessing global resources and globalization to radiate to the entire Yangtze River Basin, become the driving engine of China's national economic growth. The spatial organization will take Shanghai as the core for international economic, financial, trade and shipping center, coordinate with other cities, and situate within large metropolitan area to form an integrated comprehensive economic area. It will no doubt be the world class urban agglomeration with strongest comprehensive competitiveness. In this urban agglomeration, we shall let Shanghai play fully its central role in economy, finance, trade, and shipping, and its role as a global city. With the supports of Shanghai-Nanjing, Shanghai-Hangzhou-Yong high-tech industrial belt and modern service development belt, this urban agglomeration will become the bases for advanced manufacturing and modern services with global influence. Current development shall focus on the development of Shanghai-Nanjing and Shanghai-Nanjin-Yong main axes, and the coastal, River area, and Nanjing-Huzhou-Hangzhou sub-axes. In the meantime, we shall strengthen the efforts in environmental remediation and protection within the agglomeration to enhance its regional sustainability. In the future, the Yangtze Delta Urban Agglomeration will absorb Jianghua Urban agglomeration to become the Lower Reaches of Yangtze River Urban Agglomeration, a world-class urban agglomeration with the strongest comprehensive competitiveness.

2. Pearl River Delta Urban Agglomeration: the most competitive and dynamic world-class urban agglomeration in Asia-Pacific Region. Pearl River Delta Urban Agglomeration includes Guangzhou, Shenzhen, Zhuhai, Foshan, Jiangmen, Zhaoqing, Huizhou, Dongguan, Zhongshan and Hong Kong, Macao Special Administrative Regions. It corresponds to the primary urbanized region in the National Main Function Zones–Pearl Delta Region, and the Pearl Delta Key Town Agglomeration in National Urban system Planning. The total land area is 55,200 $km^2$, accounting for around 0.58 % of the national total. In 2010, the urban build-up area accounts for 6.58 % of the national total. Population accounted for 2.25 % of the national total. Among them, urban population accounted for 4.71 % of the national total. Economic total output accounted for 8.62 % of the national total. Actually utilized foreign investment accounted for 9.68 % of the nation al total. The core cities are national central city, Guangzhou, and regional central city, Shenzhen. According to the "Pearl River Delta Reform and Development Plan (2008–2020)" approved by the National Development and Reform Commission, the Pearl River Delta Urban Agglomeration will be an experimental zone to explore the scientific development model, the pilot area of deepening reform, an important international portal

for expanding opening up, the world's advanced manufacturing and modern service industry base, and a national major economic center. To achieve these goals, we must give greater autonomy to the development of the Pearl River Delta and continue to allow it to be an "experimental field" of national reform. We shall allow bold exploration and pilot experimentation to create new experiences for the development of Socialism with Chinese characteristics. In the meantime, we must adhere to the "one country two systems" policy, promote close cooperation and integrated development with Hong Kong and Macao, and build mutually supplementary centers for international shipping, logistics, trade, exhibition, tourism and innovation. Together with Hong Kong and Macao, we aim at creating the most dynamic and internationally competitive urban agglomeration in Asia Pacific Region.

3. Beijing-Tianjin-Hebei Urban Agglomeration, the world class urban agglomeration with the strongest national innovation capacity. The Beijing-Tianjin-Hebei Urban Agglomeration includes 10 cities, namely, Beijing, Tianjin, Tangshan, Langfang, Baoding, Qinhuangdao, Shijiazhuang, Cangzhou, Chengde, and Zhangjiakou. This urban agglomeration corresponds to the main urbanized areas in the National Main Functional Areas—the Beijing-Tianjin-Hebei Area in the Bohai Rim and Beijing-Tianjin-Hebei key town agglomeration in the national urban system planning. Its total land area is 182,500 $km^2$, accounting for 1.9 % of the national total. In 2010, urban construction land area (built-up area) accounted for 7.59 % of the national total. Population accounted for 6.30 %. The urban population accounted for 11.11 %. Its economy accounted for 9.06 %. The actual utilization of foreign investment accounted for 10.56 %. The core cities are the two national central cities of Beijing and Tianjin. The future direction of the Beijing-Tianjin- Hebei Urban Agglomeration is as follows: First, based on the Chinese Capital City, Beijing, we will build a new global urban agglomeration with dual cores and highly coordinated regional development. Specifically, Beijing will be built to be a world city. Beijing-Tianjin will be a dual core global city. This urban agglomeration will have very high openness to the international market, and also will participate in international competition. This urban agglomeration will become the most active urbanized regions in the Northern China. Second, based on the national innovation bases, we will be able to build this urban agglomeration into a modern urban economic region with a complete industrial system from basic industries, high-end manufacture and high-level service industries. In the process of improving national creativity, optimizing the investment environment, enhancing the regional competitiveness, and implementing the recycling economic strategy, this urban agglomeration will become a base with strongest national innovation; have a complete industrial system, with agriculture, energy and raw material industries, transportation industries as the main basic industries, modern manufacturing and modern service industries as the main high-end industries; and become a global level super urban agglomeration. In the process, we need to strengthen the dual cores (Beijing and Tianjin)'s driving function, break the restrictions set by administrative boundaries,

promote the free movement and optimize the distribution of production elements, improve the development level of modern service industries, and optimize the distribution of advanced manufacturing industries. The key focus will be the Jing-Jin main corridor, Jing- Shi(jiazhuang) and Jing-Qin(huangdao) sub corridor, and the coastal town belt. We will also need to strengthen the constructions of coastal ports, and high-speed inter-urban transportation infrastructure to enhance the integration. In the meantime, we shall devise overall planning to protect regional water resources and ecological environment to constantly improve the living conditions. In the future, the Beijing-Tianjin-Hebei, Eastern Liaoning Peninsula, and Shandong Peninsula Urban Agglomerations can be integrated to the Bohai Rim Urban Agglomeration, becoming a world-class urban agglomeration that supports the entire nation's economic development.

4. The (Middle Yangtze River) Urban Agglomeration, a national level urban agglomeration that drives the development of Central China. The Middle Yangtze River Urban Agglomeration, also known as the Middle Yangtze River Urban Agglomeration is composed of Wuhan Urban Agglomeration, Changsha-Zhuzhou-Xiangtan Urban Agglomeration and Poyang Lake Urban Agglomeration, including 12 cities in Hubei Province, namely, Wuhan, Huangshi, Ezhou, Xiaogan, Huanggang, Xianning, Xiantao, Qianjiang, Tianmen, Yichang, Jingzhou, Jingmen; 8 cities in Hunan Province, namely, Changsha, Zhuzhou, Xiangtan, Hengyang, Yueyang, Yiyang, Changde, and Loudi; and 8 cities in Jiangxi Province, namely, Nanchang, Jiujiang, Jingdezhen, Yingtan, Xinyu, Fuzhou, Yichun, and Pingxiang. The total land area is 281,900 $km^2$, accounting for 2.94 % of the national total. In 2010, the urban construction land area (built-up area) accounted for 6.39 %. Population accounted for 8.44 %. The urban population accounted for 8.95 %. The total economic output accounted for 7.32 %. The actual utilization of foreign investment accounted for 6.78 %. It corresponds to the key urbanized area National Main Functional Areas–the middle reaches of Yangtze River region and the of the Wuhan Town Agglomeration, Eastern Hunan Town Agglomeration and Nanchang-Jiujiang town agglomeration national in the national urban system planning. The core city is the constructing national center, Wuhan City. In the future, the Middle Yangtze River Urban Agglomeration will become the fourth national level urban agglomeration that drives the development of Central China. With Wuhan, Changsha and Nanchang as the centers, we intend to promote the integration of Wuhan Urban Circle, Changsha-Zhuzhou-Xiangtan Urban Agglomeration, and Poyang Lake Urban Agglomeration. The key construction focus will be on the Wu(han)-Chang(sha) and Wu(han)-Nan(chang) main corridor, and the Chang(sha)-Nan(chang) sub corridor. This urban agglomeration will become China's major transportation hub, base for technological innovation, advanced manufacturing and modern service industry, a demonstration area for the national resource-saving and environment-friendly society, and a core growth area that leads the central region.

There are a few specific issues that need to be addressed in building the Middle Yangtze River Urban Agglomeration.

The reasonable spatial extent of this Urban Agglomeration should include only the above mentioned 3 provinces and 28 cities. Jianghuai Urban Agglomeration should not be included within this agglomeration.

By fully taking account of the geographical proximity, functional complementarity, cultural identity, close connectivity and common interests, common policy orientation and common development potential and other factors, according to the standard of urban agglomeration development, using breaking point model and gravitation model, we can actually calculate the reasonable spatial extent of the Middle Reaches of Yangtze River Urban Agglomeration is just the middle reaches of the Yangtze River. In particular, it includes the above mentioned 28 cities from the three provinces, covered within the areas from Yichang, Hubei Province to Hukou, Jiangxi Province.

From the point of view of historical connection, economic ties, transportation accessibility and opening up, the Middle Reaches of the Yangtze River Urban Agglomeration has formed prototype of fully fledged urban agglomeration that includes Wuhan, Changsha-Zhuzhou-Xiangtan and Poyang Lake Urban Agglomerations, forming the so-called middle reach "triangle" urban agglomeration spatial structure. In the meantime, the Jianghuai Urban Agglomeration locates far from the Middle Reaches of the Yangtze River (it's in the lower reaches of Yangtze River). There are very little economic or technological ties between these two agglomerations. Instead, Jianghua Urban Agglomeration is more closely related with the Yangtze Delta Urban Agglomeration for a fairly long time. For its own sake, the Jianghua Urban Agglomeration shall not try to move westwards to join the Middle Yangtze River Urban Agglomeration. Instead, it shall move eastwards to try to join in the Yangtze River Delta Urban Agglomeration, and contribute to promoting the Yangtze River Delta Urban Agglomeration to be a world-class super urban agglomeration.

We must scientifically compile a master plan for the Middle Yangtze River Urban Agglomeration based on the reasonably delineated spatial extent. Once the reasonable spatial extent as we proposed above is decided, the extent shall not be changed due to change of administrations. Instead, an integrated and comprehensive urban agglomeration master plan shall be devised and implemented. The goals for the master plan are to ensure the "ten-sames," namely, same plan, same industrial chain, same urban and rural development, same transportation network, same information sharing platform, same financial clusters, same market, same promotion for science and technology, same environmental protection and treatment, and same construction of local ecological systems. Via these "ten-sames," we will see a highly integrated Middle Yangtze River Urban Agglomeration in regional industrial development and distribution, infrastructure construction, regional market construction, urban and rural development, environmental protection and ecological construction, and

social development and social security system construction. We must allow the market mechanism to play the primary role in the formation of this urban agglomeration. With the infrastructure construction as the basis, we intend to build a holistic and comprehensive grand transportation network.

Establish coordinated working mechanisms from national level for building the Middle Yangtze River Urban Agglomeration. Apparently, since this urban agglomeration crosses Hubei, Hunan and Jiangxi and 28 cities, under current development level, any one province or city will hardly take the position as the core to drive the entire urban agglomeration's development. From this standpoint as well as considerations of promoting Central China and China's National Security, it is suggested to break the administration restrictions by integrating the advantageous resources of the three provinces. We suggest establishing a national level coordinating and leading agency for the Middle Yangtze River Urban Agglomeration that will coordinate and negotiate major issues concerning the overall construction of the Urban Agglomeration. The goal is to form a healthy coordinating working mechanism, mobilize the enthusiasms of the three provinces, and avoid selfish, local-centered activities that might harm the entire Urban Agglomeration. Within each province, there could be branch offices of this super-provincial agency led by provincial leaders who will facilitate the national level agency's daily operations.

Overall construction of the urban agglomeration shall be highly emphasized so that we can build the Middle Yangtze River Urban Agglomeration to be a national level urban agglomeration that drives the overall development of Central China. This Urban Agglomeration is one of the key developing zones to accelerate China's industrialization and urbanization. Its healthy and sustainable development has profound strategic meaning to the urbanization mode in the middle reaches of the Yangtze River, and to the exploration of a healthy and Chinese Characterized urbanization path. In the future, the key construction shall be focused upon the two main transportation corridors, namely, Wu(han)-Chang(sha) and Wu(han)—Nan(chang), and the one sub-corridor, i.e., Chang (sha)—Nan(chang). This urban agglomeration will become a nationally important comprehensive transportation node, and bases for science and technology innovation, advanced manufacturing, and modern service industries. This urban agglomeration will also strive to build a resource-conserving and environment-friendly ecological urban agglomeration and become the leading growth area for the development of Central China. Moreover, while building the middle and low reaches of Yangtze River water ecological security zone, this urban agglomeration will also provide a demonstration for the comprehensive improvement of China's great lakes and great rivers, and strong strategic support for China's national food and ecological security.

It must be recognized that the construction will take a long time a much effort. Any rush and hasty actions will lead to ultimate failure. From the theory of urban agglomeration development, as of right now, the Middle Yangtze River

Urban Agglomeration is still in its infancy. It will be a fairly long time and will be full of trial and errors before a highly integrated urban agglomeration can be finished. Most importantly, we must realize that the urban agglomeration is not something that can be determined by sheer subjective wills, and is not a drawn item on paper maps. Instead, a highly integrated urban agglomeration is "nurtured" by market mechanism, and "done" vial cooperation among cities. With this in mind, we must fully realize that urban agglomeration construction takes time and effort, must follow the stage laws of urbanization to develop gradually and sustainably develop, and avoid hasty and rush actions.

5. The Chengdu-Chongqing Urban Agglomeration: A national level urban agglomeration that lead the development of Western China. Chengdu-Chongqing Urban Agglomeration include Chongqing (specifically including 31 cities, namely, Wanzhou, Fuling, Yuzhong, Dadukou, Jiangbei, Shapingba, Jiulongpo, South Bank, Beibei, Pine Valley, Yubei, Banan, Changshou, Jiangjin, Hechuan, Yongchuan, Nanchuan, Shuangqiaoshan Qijiang, Tongnan, Tongliang, Dazu, Rongchang, Bishan, Liangping, Fengdu, Dianjiang, Zhong County, Kaixian, Yunyang, and Shizhu), Chengdu, Deyang, Mianyang, Meishan, Ziyang, Suining Leshan, Ya'an, Zigong, Luzhou, Neijiang, Nanchong, Yibin, Dazhou, and Guang'an. It corresponds to the main urbanization area in the National Main Functional Area Planning and national urban system plan—Chengdu-Chongqing Region. The total land area is 240,400 $km^2$, accounting for 2.5 % of the national total. In 2010, the urban build-up area accounted for 5.28 %. Total population accounted for 8.07 %. Urban population accounted for 6.78 %. Economic volume accounted for 5.31 %. Actual utilization of foreign investment accounted for 6.29 %. The national central city, Chongqing City and regional central city, Chengdu City, are the core cities of this urban agglomeration. By 2020, it is planned that the build-up area of the cities will be extended to 5,500 $km^2$. Total urban population will reach 60 million. Chongqing and Chengdu will play significant leading roles as the core cities. Relying on the important transportation corridors such as the Yangtze River, Chengdu-Mianyang-Leshan, and Chengdu-Chongqing, we will focus on the Chengdu-Chongqing main corridor and Chengdu-Mianyang-Leshan sub- corridor construction, and build this urban agglomeration to be a significant national base for high-tech industries, advanced manufacture and modern services industries. In addition, this urban agglomeration will also serve as a center for science and technology and education, commerce and trade, and finance, and a comprehensive transportation node. By building a national comprehensive experimental zone for integrated urban and rural reform, this urban agglomeration will become the largest dual core urban agglomeration in Western China, the largest strategic support and primary strategic pole for implementing the Great West Development national strategy, the center of the upper and middle reaches of the Yangtze River, and the fifth national level urban agglomeration that will drive the development of Western China.

#### 4.1.3.2 Steadily Constructing the 9 Regional Level Urban Agglomerations

Regional urban agglomerations are important urbanization regions that serve to drive regional economic development. They are second level national urban agglomeration. These urban agglomerations often have one or more national central cities or regional central cities as their core city/cities. They often locate in areas with strong resources and environment carrying capacity, relatively complete regional urban system, and their central city/cities often has/have strong radiating and driving capability in local development. In those areas, we shall focus on completing urban infrastructure, improving central city/cities' functions, and promoting division of labor and cooperation to actively nurture regional urban agglomerations. In the future, we propose to steadily construct 9 regional urban agglomerations. In particular, there are 3 regional urban agglomerations in Eastern China. 3 regional urban agglomerations that will drive Central China's development and 3 regional urban agglomerations that serve as the developmental driving forces for Western China. Currently, these regional urban agglomerations account for 9.84 % of national land area, with 24.67 % of national population, 24.48 % constructed land areas, 28.04 % urban population, 28 % national GDP, 31.18 % societal fixed asset investment and 26.92 % actual utilized foreign investment.

1. Central and South Liaoning Urban Agglomeration. This regional urban agglomeration includes 12 cities in central and south Liaoning Province, namely, Shenyang, Dalian, Dandong, Jinzhou, Yingkou, Panjin, Huludao, Anshan, Fushun, Benxi, Liaoyang, and Tieling. It corresponds to the main urbanized areas in the national main functional areas—Bohai Sea region and central and south Liaoning, and also the central and south Liaoning town agglomeration in national urban system planning. The total land area is 117,100 $km^2$, accounting for 1.22 % of national total. In 2010, the urban construction land (built-up area) accounted for 4.27 % of national total. Population accounted for 2.77 %. Urban population accounted for 4.28 %. Economy accounted for 4.49 %. The actual utilization of foreign investment accounted for 10.74 %. The regional central city, Shenyang is the core city of this regional urban agglomeration. The developmental focus shall be centered on Shenyang and Dalian, relying on Liaoning coastal economic belt and Shenyang economic zone as support in the construction of Shenyang-Dalian main axis and coastal sub-axis, and built the region to be China's major equipment manufacturing base, the new raw material base and technological innovation base. In the future, this urban agglomeration will become China's major petrochemical and steel-based raw material processing industry base, important machine tools and large equipment manufacturing industrial base and strategic defense industrial base, the largest electronic information, communications equipment, bio technology, new materials, mechanical and electrical integration and other high-tech industry cluster and the financing, insurance, corporate headquarters, research and development, market trading, consulting and other information modern

service area in Northeastern China. This urban agglomeration will serve as the core area that drives the Northeast China's economic growth and increase its participation in international competitiveness, and eventually become a focal point of regional development in Eastern Liaoning Peninsula.

2. Shandong Peninsula Urban Agglomeration. The Shandong Peninsula Urban Agglomeration includes 13 cities on the Shangdong Peninsula, namely, Jinan, Qingdao, Yantai, Weihai, Rizhao, Dongying, Weifang, Zibo, Tai'an, Laiwu, Binzhou, Dezhou, and Liaocheng. It corresponds to the main urbanized areas of the national main functional areas—the Shandong Peninsula sub region of the Bohai Rim region, and the Shandong Peninsula town agglomeration of the national urban system planning. It land area is 112,700 $km^2$, accounting for 1.17 % of the national total. In 2010, its urban construction land (built-up area) accounted for 4.95 % of the national total. Population accounted for 4.68 %. Urban population accounted for 6.31 %. Economy accounted for 7.47 %. The actual utilization of foreign investment accounted for 4.31 %. The development focus shall be on coordinating arrangements for regional infrastructure construction and coastal ports development. Via strengthening the dual cores of Jinan and Qingdao cities, relying on Qingdao and the coastal development axis, we shall focus on the construction of Jinan Economic Zone, and Shandong Peninsula Economic Circle. This urban agglomeration will be built into China's key advanced manufacturing and strategic emerging industrial base, the primary oceanic (blue) economic zone and efficient ecological economic demonstration zone. Based on the goal of building the Shandong Peninsula Oceanic Economic Zone, the future of this urban agglomeration will be a national demonstration zone for oceanic economy, national modern oceanic industrial cluster, the national oceanic innovation reform pilot area and the primary demonstration zone for oceanic civilization. It serves as the primary driving force for development of the Shandong Peninsula.
3. The West of Taiwan Strait Urban Agglomeration. This particular urban agglomeration includes 11 cities in the west coast of the Taiwan Strait, namely, Fuzhou, Xiamen, Quanzhou, Wenzhou, Shantou, Zhangzhou and Putian, Ningde, Chaozhou, Jieyang, and Shanwei. It corresponds to the main urbanized areas of the national main functional areas–the Taiwan Strait West Coastal Economic Zone, and the corresponding town agglomeration in the national urban system planning. Its land area is 83,600 $km^2$, accounting for 0.87 % of the national total. In 2010, its urban construction land (built-up area) accounted for 3.03 % of the national total. Population accounted for 3.9 %. Urban population accounted for 4.5 %. Economy accounted for 4.1 %. The actual utilization of foreign investment accounted for 3.32 %. The developmental focus of this urban agglomeration shall be to strengthen the scientific and technological innovation, comprehensive services and cultural functions of the two core cities, i.e., Fuzhou and Xiamen. In addition, relying on the developmental history, we shall build the private economy innovation development demonstration area in Wenzhou and Quanzhou, and promote the integration of Xiamen-Zhangzhou-Quanzhou city groups, Fuzhou-Putian-Ningde city groups, and Shantou-Chaozhou-Jieyang

city groups. The key is to build the coastal main axis, integrated hub of cross-strait economic and trade, and an important base for cross-strait cultural exchanges and direct interaction. The future developmental goals for the West of Taiwan Strait Urban agglomeration will serve both economic and political purposes. Following the principles of highlighting development, Taiwan, coordination, innovation, people-oriented and fulfillment, for 10–15 years, this urban agglomeration will significantly increase its comprehensive strength. In addition, this urban agglomeration will become a resource conserving, environment friendly and urbanization innovative zone. It will serve as an important platform and frontier for interaction between the mainland and Taiwan, an important propeller for the economic development in Fujian Province, an experimental zone for free trade between and ultimate unification of mainland and Taiwan.

4. Central Plain Urban Agglomeration. This urban agglomeration includes 9 cities in the Central Plain area, namely, Zhengzhou, Luoyang, Kaifeng, Xinxiang, Jiaozuo, Xuchang, Jiyuan, Pingdingshan, and Luohe. Its land area is 58,700 $km^2$, accounting for 0.61 % of the national total. In 2010, its urban construction land (built-up area) accounted for 2.64 % of the national total. Population accounted for 3.39 %. Urban population accounted for 3 %. Economy accounted for 3.06 %. The actual utilization of foreign investment accounted for 2.42 %. It corresponds to the main urbanized areas in the national main function areas–the Central Plain Economic Zone and corresponding town agglomeration of the national urban system planning. This urban agglomeration is a strategic urban agglomeration that serves strategic support function for driving the development of Central China. Zhengzhou serves as the primary center, Luoyang the secondary center, the developmental goal of this region is to promote the integrated development of Zhengzhou-Kaifeng (Zhengbian) region. The key regions are Zhengzhou-Kaifeng New District and Luoyang New District, focusing on creating developmental axes along the Longhai and the Beijing-Guangzhou railways. By fostering new development axes, building up the core area along the Longhai economic belt and China's major modern integrated transport hub, we shall be able to create a demonstration area for coordinated development between industrialization/urbanization and agricultural modernization, and civilization inheritance and innovation area of China. The key for the industrial development in the Central Urban Agglomeration is to accelerate the promotion of Zhengzhou City to be a regional central city, accelerate the development of new industries, build the area to be an important base for advanced manufacturing, science and technological innovation, textile, food process, petrochemical and pharmaceutical industries, and auto parts. Geographically, there will be four industrial developmental belts, namely, the Zhengzhou-Kaifeng urban industrial corridor, Xinxiang- Zhengzhou-Luohe along the Beijing-Guangzhou Railway industrial development belt, Xinxiang-Jiaozuo-Jiyuan south Taihang Mountain industrial development belt, and Luoyang-Pingdingshan-Luohe industrial development belt. This urban

agglomeration will serve as the core growth pole for the Central Plain regions and Central China's development [10].

5. Harbin-Changchun Urban Agglomeration. This urban agglomeration includes 10 cities, namely, Harbin, Daqing, Qiqihar, Suihua, Mudanjiang, Changchun, Jilin, Matsubara, Siping, and Liaoyuan. Its land area is 280,200 $km^2$, accounting for 2.92 % of the national total. In 2010, its urban construction land (built-up area) accounted for 3.79 % of the national total. Population accounted for 3.46 %. Urban population accounted for 4.23 %. Economy accounted for 3.74 %. The actual utilization of foreign investment accounted for 2.5 %. It corresponds to the main urbanized areas in the national main function areas—the Harbin-Changchun region and corresponding Harbin town agglomeration of the national urban system planning. It is and important urban agglomeration to revitalize China's Northeast old industrial base. It is also a frontier urban agglomeration for China's cooperation within the Northeast Asia region. In the construction process of Harbin-Changchun Urban Agglomeration, we shall follow the guidance outlined in the 《Cooperation Development Plan for China Tumen River Area—With Changchun-Jilin-Tumen River as the Pilot Zone》 (The State Council, Regional Development and Reform, 2009, #2554). With Tumen River as the pilot area, facing the entire Northeast Asia, serving the Great Northeast, accelerating the construction of the Changchun-Jilin-Tumen River Pilot Zone, we will build this area to be a pioneer demonstrative area for the development and opening-up of China's border regions, an important port of China's opening-up to the Northeast Asia, a significant platform for economic and technological cooperation in Northeast Asia, and the new growth pole of Northeast China. In the process, we shall strengthen the driving functions of Harbin, Changchun, and Jilin, focus on the constructions of Harbin-Changchun main axis and Suiman-Huiwu sub axis, promote the development of Harbin-Daqing-Qiqihar-Mudanjiang-Suihua urban agglomeration and Central Jilin Urban agglomeration, accelerate the transition of resource-based cities, so that to build this important platform for international cooperation in Northeast Asia, important economic growth pole, and ecological and livable urban agglomeration.
6. Jianghuai Urban Agglomeration. This urban agglomeration includes 10 cities, including Hefei, Wuhu, Bengbu, Huainan, Anqing, Chizhou, Tongling, Ma'anshan, Chuzhou, and Xuancheng. Its land area is 71,100 $km^2$, accounting for 0.74 % of the national total. In 2010, its urban construction land (built-up area) accounted for 2.53 % of the national total. Population accounted for 2.27 %. Urban population accounted for 2.07 %. Economy accounted for 2.02 %. The actual utilization of foreign investment accounted for 2.24 %. It corresponds to the main urbanized areas in the national main function areas—the Jianghuai region. It is an important gateway urban agglomeration for the Central China regions to undertake the Eastern China's industrial transfer, and also a "hinterland urban agglomeration" that will facilitate the westward radiation of the Yangtze River Delta region. The goals of Jianghua Urban agglomeration will focus on thoroughly implementing the State Council

approved "Plan of Wanjiang Urban Belt Demonstration Area for Industrial Transfer" (National Letter [20152010] #5, The State Council, 2010). It shall adhere to principles of market-oriented, government-driven, reasonable division of labor and cooperation, and differential development. Spatially, the urban agglomeration will be based on Anhui, relying on Wanjiang to into the Yangtze River Delta. In the meantime, it will connect the Central and Western China, constantly explore new approached of scientific development, and develop to be a significant economic growth pole of the Central China by centering on Hefei and Wuhu Cities, focusing on the construction of Wanjiang Development Axis, promoting integration of Hefei-Huainan, Wuhu-Ma'anshan, and Tonglin-Chizhou, encouraging integrated development among cities across both banks of Yangtze River, deepening the interaction with the Yangtze Delta, strengthening cooperation and interaction with surrounding urban agglomerations, and building into a significant demonstrative area of industrial transfer. Jianghuai Urban Agglomeration will be built to be the priority area to accept Yangtze River Delta's westward extension, a strategic support for coordinated development of the entire Yangtze River Economic Belt, significant growth pole of Central China, and important advanced manufacture and modern service industry bases (Hefei Committee for Development and Reform, 2008).

7. Urban Agglomeration. This urban agglomeration includes 6 cities in Shaanxi Province, namely, Xi'an, Xianyang, Baoji, Tongchuan, Weinan and Shangluo, and one city, Tianshui in Gansu Province. Its land area is 89,100 $km^2$, accounting for 0.93 % of the national total. In 2010, its urban construction land (built-up area) accounted for 1.7 % of the national total. Population accounted for 2.19 %. Urban population accounted for 2.05 %. Economy accounted for 1.58 %. The actual utilization of foreign investment accounted for 0.94 %. It corresponds to the main urbanized areas in the national main function areas—the Guangzhong-Tianshui region. According to the State Council approved "Development Plan for Guangzhong-Tianshui Economic Zone," (The State Council, Western Development and Reform 2009, #1500), the future development goal for Guangzhong Urban Agglomeration will be centered on Xi'an (Xianyang) to accelerate the construction of national level Xi'an-Xianyang New District. With the Longhai Railway and Lianhuo Expressway corridor as the main axes, development of this urban agglomeration aims to promoting integration of Xi'an-Xianyang, Xi'an-Weinan, Xi'an-Tongchuang, deepening the interaction with Chengdu-Chongqing and Lanzhou-Xining Urban Agglomerations, building a strategic inland economic development and open-up platform, nationally important advanced manufacturing and high-tech industry base, and nationally important historical and Chinese cultural demonstrative base. (Shaanxi Department of Construction, *Planning for Guanzhong Urban Agglomeration*, 2007) Eventually, Guangzhong Urban Agglomeration will serve as a strategic supportive node for the development of the Silk Road Economic Belt [11].
8. Southern Guangxi Urban Agglomeration. This urban agglomeration includes Nanning, Beihai, Fangchenggang, Qinzhou, Yulin, and Chongzuo cities. Its

land area is 72,000 $km^2$, accounting for 0.76 % of the national total. In 2010, its urban construction land (built-up area) accounted for 1.16 % of the national total. Population accounted for 1.69 %. Urban population accounted for 0.91 %. Economy accounted for 0.98 %. The actual utilization of foreign investment accounted for 0.37 %. It corresponds to the main urbanized areas in the national main function areas—the Beibu Gulf region and corresponding Beibu Gulf town agglomeration of the national urban system planning. The future for this urban agglomeration is to become a gulf urban agglomeration that serves for international cooperation of China-ASEAN Free Trade Area. The focus is to construct Beibu Gulf Rim main axis, relying on its locational advantage of deep-water port to develop coastal heavy and chemical industries, modern service industries and coastal tourism, and become a significant service base for opening up to ASEAN countries and exploit ocean resources in South China Sea.

9. North Slope of Tianshan Mountain Urban Agglomeration. This urban agglomeration includes 8 cities in Xinjiang Uyghur Autonomous Region, namely, Urumqi, Shihezi, Changji, Fukang, Kuitun, Wusu, Wujiaqu, and Karamay. Its land area is 59,500 $km^2$, accounting for 0.62 % of the national total. In 2010, its urban construction land (built-up area) accounted for 1.41 % of the national total. Population accounted for 0.31 %. Urban population accounted for 0.7 %. Economy accounted for 0.56 %. The actual utilization of foreign investment accounted for 0.08 %. It corresponds to the main urbanized areas in the national main function areas—the North Slope of Tianshan Mountain region and corresponding Urumqi town agglomeration of the national urban system planning. It will be the west end of the Silk Road Economic Belt in China and a land bridge urban agglomeration that serves international cooperation between China and the five Central Asia countries. This urban agglomeration will be centered on Urumqi-Changji, with Kuitun-Dushanzi-Wusu as the sub-center to build a nationally important energy base, important international commerce and logistic center of Northwestern China, important export process base, and important gateway and land transportation node opening up to Central and West Asia.

#### 4.1.3.3 Guide and Nurture Six New Regional Urban Agglomerations to-Be

The six urban agglomerations to-be that need to be guided and nurtured to become full-fledged urban agglomerations are all located in the Central and Western China. They all belong to main urbanization regions as identified in the national main function area, and also important development regions in their corresponding provinces. They play significant role in their corresponding provinces' economic development. In the meantime, these urban agglomerations to-be are still in the preliminary stage of urban agglomeration development, namely, the stage of

forming a metropolitan area. In the future, they can be developed to relatively small scale urban agglomerations via efforts. As of now, they are nurtured as regional metropolitan areas. In the future, once they develop to the stage of mature urban agglomerations, they will play significant roles of supporting provincial economic development and absorbing urbanized population. As of right now, the land area of these regional urban agglomerations to-be accounted for 6.92 % of the national total. They concentrate 6.77 % of the population, 6.39 % urban built-up area, 6.55 % urban population, 6.08 % GDP, 6.58 % social fixed asset investment and 2.74 % actually utilized foreign investment. In particular, details of these six regional urban agglomerations to be are outlined as follows.

1. Jinzhong (Central Shanxi) Urban Agglomeration. This urban agglomeration to-be includes Taiyuan, Jinzhong, Yangquan, Xinzhou, Linfen, Changzhi cities and Fenyang and Xiaoyi Cities of Luliang. It corresponds to the main urbanized area of the national main function areas–Jingzhong city groups, and corresponding central Shanxi town agglomeration. Its land area is 89,300 $km^2$, accounting for 0.93 % of the national total. In 2010, its urban construction land (built-up area) accounted for 1.24 % of the national total. Population accounted for 1.48 %. Urban population accounted for 1.73 %. Economy accounted for 1.27 %. The actual utilization of foreign investment accounted for 0.32 %. The development orientation of this urban agglomeration to-be will build the Taiyuan Metropolitan Area with Taiyuan as the core, and build the Jingzhong Urban Agglomeration centered on the Taiyuan Metropolitan Area. The main tasks include improving Taiyuan's central city functions, promoting integration of Taiyuan-Jingzhong, strengthen economic concentration and population attraction capacity for the primary nodal cities of Xinzhou, Changzhi, Linfen, and Yangquan. The urban agglomeration will be an important national base for energy and raw materials, coal chemical industry, equipment manufacturing, and cultural tourism, and a demonstrative zone for resource-based economy transition.
2. Hohhot-Baotou-Ordos-Yulin Urban Agglomeration. This urban agglomeration to be includes Hohhot, Baotou, Ordos, Wulanchabu, Bayannao'er, Wuhai, and Yulin. Its land area is 295,900 $km^2$, accounting for 3.08 % of the national total. In 2010, its urban construction land (built-up area) accounted for 1.63 % of the national total. Population accounted for 1.11 %. Urban population accounted for 1.25 %. Economy accounted for 2.35 %. The actual utilization of foreign investment accounted for 1.67 %. It corresponds to the main urbanized areas in the national main function areas–the Hohhot- Baotou-Ordos-Yulin region. The development orientation shall focus on building the Hohhot-Baotou-Ordos metropolitan area with Hohhot as the center, which again serves as the center of the future urban agglomeration. Main tasks include strengthening the central cities' functions, promoting interactive development of urbanization and industrialization, accelerating population concentration, building into China's significant strategic resource supportive base, and the bridgehead of open up to the North.

3. Central Guizhou Urban Agglomeration. This urban agglomeration to-be includes six cities in Guizhou Province, namely, Guiyang, Zunyi, Anshun, Bijie, Duyun, and Kaili. Its land area is 55,100 $km^2$, accounting for 0.57 % of the national total. In 2010, its urban construction land (built-up area) accounted for 0.8 % of the national total. Population accounted for 1.23 %. Urban population accounted for 0.93 %. Economy accounted for 0.58 %. The actual utilization of foreign investment accounted for 0.14 %. It corresponds to the main urbanized areas in the national main function areas–the Central Guizhou region. The main tasks include accelerating the construction of a national strategic Guian New District, building the Guiyang Metropolitan area centered on Guiyang that will also be the center of the future urban agglomeration. Via focusing on Zuiyi-Guiyang-Anshun main axis to accelerate the construction of Guian New District and promote integrated development. Specifically, this urban agglomeration shall focus on developing characteristic and advantageous industrialsindustry, greatly enhancing the economic strength of cities and population absorbing capacity, and eventually building into nationally significant energy and raw materials and characteristic light industry base.
4. Central Yunnan Urban Agglomeration. This urban agglomeration to-be includes Kunming, Qujing, Yuxi, and Chuxiong cities. Its land area is 95,900 $km^2$, accounting for 1 % of the national total. In 2010, its urban construction land (built-up area) accounted for 1.08 % of the national total. Population accounted for 1.54 %. Urban population accounted for 1.21 %. Economy accounted for 0.98 %. The actual utilization of foreign investment accounted for 0.56 %. It corresponds to the main urbanized areas in the national main function areas–the Central Yunan region and corresponding Central Yunan town agglomeration of the national urban system planning. Main tasks for this urban agglomeration include accelerating the central Yunan industrial New District, building the Kunming Metropolitan area centered on Kunming that serves as the center of the future urban agglomeration. Via focusing on constructions of Qujing-Kunming-Yuxi, and Kunming-Chuxiong development axes, we'll promote integrated development in the region, build regional international transportation nodes. In the future, the urban agglomeration will be an important base for characteristic resource deep processing and cultural tourism, and also an important bridgehead to open up to the Southwest Asia, and a livable plateau urban agglomeration.
5. Lanzhou-Baiyin-Xining Urban Agglomeration. This urban agglomeration includes Lanzhou, Xining, Baiyin, Dingxi, Haidong, and Linxia cities. Its land area is 75,400 $km^2$, accounting for 0.79 % of the national total. In 2010, its urban construction land (built-up area) accounted for 0.89 % of the national total. Population accounted for 1.04 %. Urban population accounted for 0.92 %. Economy accounted for 0.57 %. The actual utilization of foreign investment accounted for 0.02 %. It corresponds to the main urbanized areas in the national

main function areas–the Lanzhou-Xining. The focus will be to construct the national level strategic Lanzhou New District, build the Lanzhou Metropolitan area centered on Lanzhou and also serves as the center for the future urban agglomeration. The main tasks include promoting integration of Lanzhou and Baiyin, interaction of Lanzhou and Xining, construction of Lanzhou New District, with Lanzhou as the core, and Longhai-Lanzhou-Xinjiang Railway, Baotou-Lanzhou and Lanzhou-Qinghai Railway, Qinghai-Tibet Railway as the main axes. In the future, this urban agglomeration will become a nationally important energy and resources deep processing base, recycling economic demonstration area, important transportation node and commerce and trading center in Northwestern China, and significant support for opening up to the West. In the end, this urban agglomeration will become a strategic support for the Silk Road Economic Belt.

6. Ningxia Yellow River Urban Agglomeration. This urban agglomeration includes 4 cities in the Ningxia Hui Autonomous Region, namely, Yinchuan, Wuzhong, Shizuishan, and Zhongwei. Its land area is 52,200 $km^2$, accounting for 0.54 % of the national total. In 2010, its urban construction land (built-up area) accounted for 0.74 % of the national total. Population accounted for 0.37 %. Urban population accounted for 0.5 %. Economy accounted for 0.33 %. The actual utilization of foreign investment accounted for 0.03 %. It corresponds to the main urbanized areas in the national main function areas–the Ningxia Yellow River region. The urban agglomeration will be centered on Yinchuan Metropolitan area with Yinchuan City as the center. In the future, we need to greatly enhance Yinchuan's function as a regional central city, promote integration of cities along the Yellow River, build Ningxia Yellow River Economic Zone and national inland open economic experimental zone, promote this urban agglomeration to be an important national energy and chemical, new material base, and regional commerce and trading center.

### *4.1.4 The New Urbanization Macro Spatial Pattern Characterized by "Axes Connect Agglomerations, Agglomerations Support Axes"*

According to the National Main Function Plan, China's primary urbanization macro pattern will be based on the so-called "two horizontal and three vertical (axes)," namely, urbanization axis along the Yangtze River, urbanization axis along the (Eurasian) Land Bridge (two horizontal), urbanization axis along the East Coast, urbanization axis along Beijing-Harbin and Beijing-Guangzhou Railways, and urbanization axis along Baotou-Kunming Railway. The 5 main urbanization axes

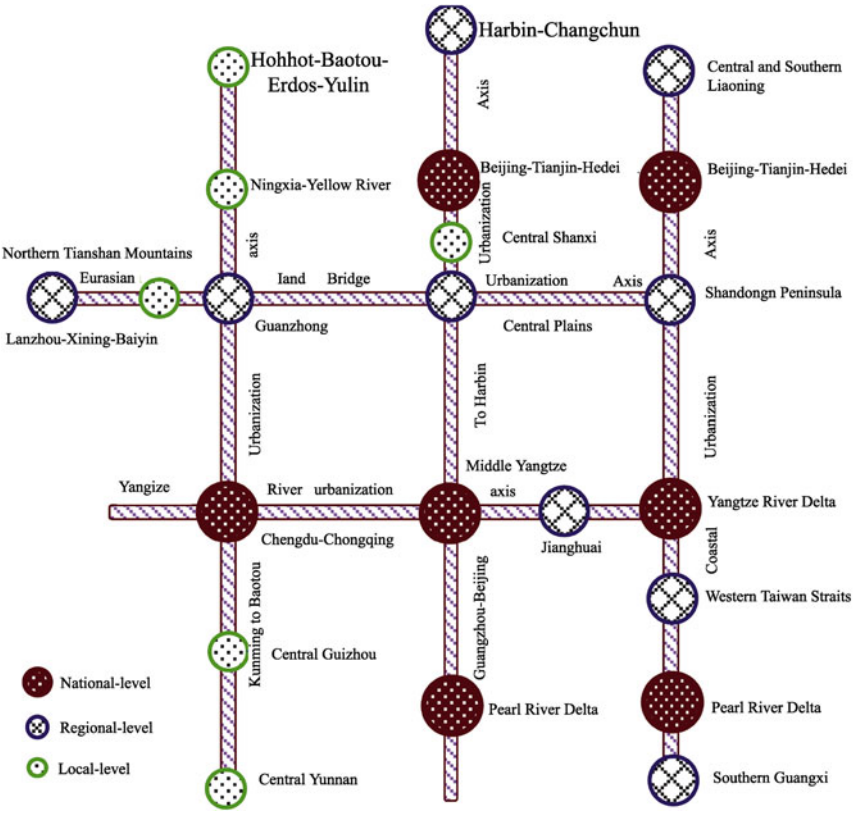


**Fig. 4.3** Framework of the spatial pattern of new-type urbanization development based on "clusters along the axes"

will closely connect the 20 urban agglomerations along the way to eventually create a macro New Urbanization spatial pattern that is "the axes connect the urban agglomerations, whilst the urban agglomerations support the axes." Among them, the Beijing-Tianjin-Hebei Urban Agglomeration is the intersection node for urbanization axes along the East Coast and Beijing-Harbin and Beijing-Guangzhou Railways. The Yangtze Delta Urban Agglomeration is the intersection node for urbanization axes along the East Coast and Yangtze River. The Pearl River Delta Urban Agglomeration is the intersection node of urbanization axes along the East Coast and Beijing-Harbin and Beijing-Guangzhou Railways. The Middle Reaches of Yangtze River Urban Agglomeration is the intersection node of urbanization axes along the Yangtze River and Beijing-Harbin and Beijing-Guangzhou Railways. Chengdu- Chongqing Urban Agglomeration is the intersection node of urban axes along the Yangtze River and Baotou-Kunming Railway (Figs. 4.3 and 4.4). All five national level urban agglomerations are the five nodes of the five primary urbanization axes.

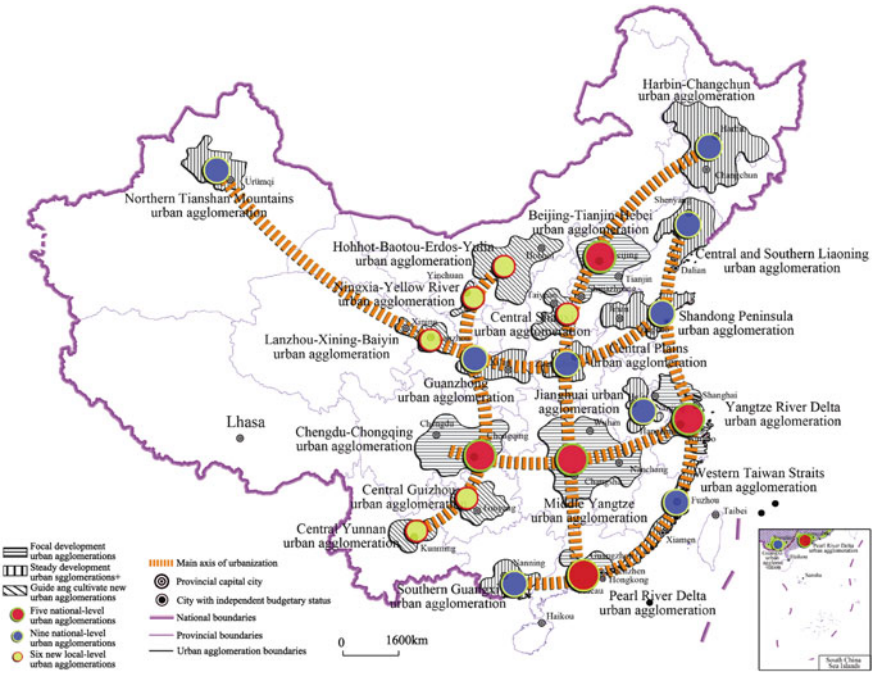


**Fig. 4.4** The new spatial pattern of China's urbanization based on "clusters along the axes"

#### 4.1.4.1 Seven Major Urban Agglomerations Along the East Coast Urbanization Axis

The East Coast urbanization axis is the main axis of China's "T"-shaped economic development. It is also China's economically strongest, most open main axis, and a main axis for China's New Urbanization implementation. This particular axis connects seven major urban agglomerations, namely, from north to south, Central and South Liaoning Urban Agglomeration, Beijing-Tianjin-Hebei Urban Agglomeration, Shandong Peninsula Urban Agglomeration, Yangtze River Delta Urban Agglomeration, West of Taiwan Strait Urban Agglomeration, Pearl River Delta Urban Agglomeration, and Southern Guangxi Urban Agglomeration. Three of them are national level urban agglomerations, and the rest are regional level. This urbanization is apparently the highly urbanized axis. As the seven urban agglomerations evolve and develop in the future, it is expected that the seven urban agglomerations could connect together to form a highly developed urban agglomeration stage, and eventually evolves to be a continuous coastal Megalopolis belt that runs all the way from Liaoning to Guangxi.

#### 4.1.4.2 Four Urban Agglomerations Along the Yangtze River Urbanization Axis

The urbanization axis along the Yangtze River is another major axis in China's "T"-shaped economic development, and also one of the economically strongest main axes, and axis for implementing New Urbanization. From East to West, this particular axis connects the Yangtze River Delta Urban Agglomeration, Jianghuai Urban Agglomeration, the Middle Yangtze River Urban Agglomeration, and Chengdu-Chongqing Urban Agglomeration. Three of them are national level urban agglomerations, and the other one is a regional one. It will also become one of the highly developed urbanization main axes. As the four urban agglomerations further develop, we will expect to see a continuous Megalopolis belt along the Yangtze River.

#### 4.1.4.3 Six Urban Agglomerations Along the Beijing-Harbin and Beijing-Guangzhou Railways Urbanization Axis

The urbanization axis along the Beijing-Harbin and Beijing-Guangzhou Railways is one of the main axes in China's "#"-shaped economic development pattern. It is also one of the economically strongest main axes, and axis for implementing New Urbanization strategies. From north to south, this axis connects Harbin-Changchun Urban Agglomeration, Beijing-Tianjin-Hebei Urban Agglomeration, Central Shanxi Urban Agglomeration, Central Plain Urban Agglomeration, the Middle Yangtze River Urban Agglomeration, and Pearl River Delta Urban Agglomeration. Three of them are national level urban agglomerations, two are regional level, and one is sub-regional level. This is also one of the highly urbanized main axes. As Beijing-Tianjin-Hebei, Central Shanxi and Central Plain urban agglomerations enter high level of development, we expect to see a continuous Megalopolis belt along the Railways.

#### 4.1.4.4 Five Urban Agglomerations Along the Eurasian Land Bridge Urbanization Axis

This urbanization axis is another main axis of China's "#"-shaped economic development pattern. It is also one of the economically strongest main axes, and an axis for implementing New Urbanization Strategies. From East to West, this axis connects Shandong Peninsula Urban Agglomeration, Central Plain Urban Agglomeration, Guanzhong Urban Agglomeration, Lanzhou-Baiyin-Xining Urban Agglomeration, and North Slope of Tianshan Mountain Urban agglomeration.

Four of them are regional level urban agglomeration, and the other one is a sub-regional one. This axis is a relatively weak urbanization axis. As the national strategies of promoting Silk Road Economic Belt fully take off and the urban agglomerations continue to develop, this axis will become a strategic main axis to drive New Urbanization development in China's Northwestern areas.

#### 4.1.4.5 Six Urban Agglomerations Along the Baotou-Kunming (Baotou- Chengdu-Chongqing-Kunming) Railway Urbanization Axis

This urbanization axis is a relatively new main axis in China's economic development spatial pattern. It is also one of the main axes. From north to south, this axis connects Hohhot-Baotou-Ordos-Yulin Urban Agglomeration, Ningxia Yellow River Urban Agglomeration, Guanzhong Urban Agglomeration, Chengdu-Chongqing Urban Agglomeration, Central Guizhou Urban Agglomeration, and Central Yunnan Urban Agglomeration. One of them is a national level urban agglomeration. One is regional level; and the rest are sub-regional level. This axis contains relatively weak urbanization agglomerations. However, as the Silk Road Economic Belt is being promoted, this axis will become a strategic main axis to drive the New Urbanization development in China's southwestern areas.

## 4.2 Collaborative Development Among Large, Medium and Small Cities to Form a New Pyramid-Like Spatial Organization

If we regard urban agglomeration as an areal pattern of China's New Urbanization, the urbanization main axes as belt (linear) pattern of New Urbanization, a new, pyramid-like spatial organization of coordinated large, medium and small cities can be regarded as point pattern of New Urbanization. With the areal, belt (linear) and point spatial structures, the macro spatial structure China's New Urbanization can be summarized as "Points accumulate to agglomerations, agglomerations support axes (belts), and axes (belts) connect agglomerations."

### *4.2.1 Evaluation of the Current Pyramid-Like Spatial Organization*

#### 4.2.1.1 The Number of Cities Is Increasing Slowly, But in General Is Below What Is Supposed to Be

From 1980 to 2013, China's cities increase from 223 to 660 (Table 4.6). The annual growth rate is 3.45 %. On average around 13 cities were added annually. After 2000, however, the central government tightens the standards for setting up cities, the number of cities actually decreases. For instance, there were 663 cities in 2000, but only 661 in 2005, and 657 in 2010. Though it increased back to 660 in 2013,

**Table 4.6** Number of Chinese cities (1980–2013)

| Year | 1980 | 1990 | 1995 | 2000 | 2005 | 2010 | 2013 |
|---|---|---|---|---|---|---|---|
| Number of cities | 223 | 467 | 640 | 663 | 661 | 657 | 660 |

the total number remained almost unchanged from 2005. Yet in the meantime, the past decade is a period with accelerating urbanization rate, dramatically changing urbanization constructions, and urban diseases entering high-risk period. The relatively small amount of cities is often regarded as one of the primary reasons for increasingly severe urban diseases since increasing urban population often quickly outpaced the increasing rate of urban infrastructure. In the future, we suggest to increase the number of cities within a reasonable range.

#### 4.2.1.2 There Are Too Many Large Cities and Even More Are Reaching Large City Standard. In the Meantime, There Are Too Few Small Cities, and Their Number Decreases Fast

Theoretically, the scale and number of cities are collectively determined by complex factors such as the geographic location, natural condition, socioeconomic development history and foundation and the like. From the analysis of the sixth Census results, currently, large cities with more than 500,000 residents in the city proper increased from 59 in 1990 to 252 in 2010, an annual increasing rate of 7.94 %. In particular, there were now six super cities with more than 10 million residents in the city proper that didn't exist in 1990. The first one emerged in 2005, and increased with an annual rate of 43.1 % to 2010. Mega-cities with 5–10 million residents in the city proper increased from 2 in 1990 to 10 in 2010, with an annual increasing rate of 8.84 %. Large cities with population from 1–5 million increased from 29 to 120, annual rate of 7.76 %. Medium sized cities with population from 500,000 to 1 million increased from 28 to 106, annual rate of 7.26 %. Small cities with population between 200,000 and 500,000 increased from 117 to 253, annual rate of 4.14 %. Small towns with less than 200,000 population, one the other hand, decreased from 291 to 162, with an annual decreasing rate of 3.04 % (Table 4.7).

As can be seen from Table 4.7, in the past 20 years, although the number of Chinese cities was growing with an annual increasing rate of 1.81 %, the rates for various scale cities were drastically different. The super cities with more than 10 million people living in the city proper increased the fastest (43.1 % annual increase rate). Mega-cities (with more than 5 million residents) increased at an annual rate of 8.84 %, large cities increased at 7.76 %. Small and medium cities, however, increased much slower (4.14 %), and small towns decreased at a rate of 3.04 %. Such a dynamic of city numbers based on scales is apparently unreasonable and irrational. The direct consequence will be an instable unstable foundation for a pyramid-like scale structure, which could eventually lead to the collapse of the entire urban system.

**Table 4.7** Changes of various sizes of cities in China

| Urban sizes | Permanent residents in city proper/10,000 people | 1990 | 1995 | 2000 | 2005 | 2010/the sixth census data | Annual growth rate over the two decades/% |
|---|---|---|---|---|---|---|---|
| Large cities (including super and mega-cities) | ≥1000 | 0 | 0 | 0 | 1 | 6 | 43.1 |
| | 500–1000 | 2 | 2 | 2 | 3 | 10 | 8.84 |
| | 100–500 | 29 | 30 | 38 | 49 | 120 | 7.76 |
| | 50–100 | 28 | 43 | 53 | 78 | 106 | 7.26 |
| | Sub-total | 59 | 75 | 93 | 131 | 242 | 7.94 |
| Medium-sized cities | 20–50 | 117 | 192 | 218 | 243 | 253 | 4.14 |
| Small cities | <20 | 291 | 373 | 352 | 287 | 162 | −3.04 |
| Total number | | 467 | 640 | 663 | 661 | 657 | 1.81 |

*Note* Due to recording limitation, prior to 2000, non-agricultural population was used to calculate urban population. After 2000, however, urban population refers to the amount of residents in city proper

#### 4.2.1.3 The Pyramid-like Hierarchical Structure Turned to Inverted-Pyramid-like Structure, Causing Instable Unstable Foundation of the Urban Systems

The changing rates of different scales of cities lead to a gradual shift of the pyramid-like hierarchical urban system structure (Table 4.8). From Table 4.8, during the two decades from 1990 to 2010, the portion of large (and beyond) cities in China increased from 12.63 to 36.83 %. Medium sized cities increased from 25.25 to 38.51 %. Small cities and towns, on the other hand, dropped from 62.31 to 24.66 %. The pyramid-like hierarchical urban system had shifted drastically to an inverted "T" structure in 2006, and then to an inverted pyramid-like structure in 2010 (Fig. 4.5). Such an inverted-pyramid hierarchical structure is a severely instable structure, and goes directly against the guidelines of steadily and stably promoting New Urbanization in China. For that matter, strong measures need to be taken to optimize and adjust the current hierarchical structure to change it back to pyramid-like.

**Table 4.8** Changes of different sizes of cities in China/%

| Urban sizes | 1990 | 1995 | 2000 | 2005 | 2010 |
|---|---|---|---|---|---|
| Large and above cities | 12.63 | 11.72 | 14.03 | 19.82 | 36.83 |
| Medium-sized cities | 25.05 | 30.00 | 32.88 | 36.76 | 38.51 |
| Small cities | 62.31 | 58.28 | 53.09 | 43.42 | 24.66 |
| Total | 100 | 100 | 100 | 100 | 100 |

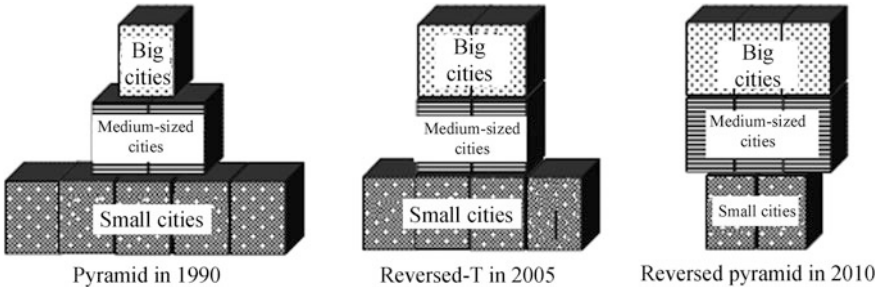


**Fig. 4.5** The structures of China's urban hierarchical system from 1990 to 2010

#### 4.2.1.4 The Present Urban Spatial Structure Is in General Reasonable, Fixed and Unchangeable

First we must admit that the overall spatial distribution of China's urban system is objectively reasonable since such overall distribution is a consequence of thousands of years of interaction between the human beings and the natural system. Such an overall spatial distribution won't, and shall not be changed in a very long time. In regard to this, planning for future urban development must fully respect the current urban spatial structure to optimize appropriately the scale structure, functional structure and spatial structure. We must adhere to the principles that the scales of the cities must be in accordance with their local conditions. If they can be developed to large cities, then develop them to large cities; if they can't, then we shall not overinvest to artificially boost them to. The sizes and developmental scales of cities must be strictly within their local resources and environmental carrying capacities. Any types of competition for sizes without considering local conditions shall be discouraged from a political level.

Analyzing from the current numbers of cities, their sizes and spatial distribution in the East, Center and West China, we can see that the East China is a location with high concentration of super cities, mega-cities and large cities. In the future, it is foreseeable that the resource and environmental carrying capacity will become the strongest restriction over urban development. For this matter, we must strictly control the number and sizes of super and mega-cities. We must strategically integrate the number of cities within the process of upgrading urban industrial structure, comprehensively treating the wide-spread haze and other environmental pollution, efficiently and intensively utilizing the resources, and promoting economic development to a higher level. In the meantime, in East China, we shall focus on increasing the compactness of urban development and concentration of industrial development, increasing the urbanization quality of the New Urbanization, addressing growing problems of urban diseases, ensuring the urbanization quality is reaching or over the global level, and promoting the global competitiveness of the cities. In Central China, urban development shall focus on increasing the population absorption capacity. To do so, we must first improve urban infrastructure, actively

guide and encourage large and medium sized cities to expand appropriately. In the meantime, we shall encourage the development of small cities and towns so that Central China is the primary experimental field for China's New Urbanization strategy. In West China, restricted by relatively less habitable environment, urban development shall focus on both large cities (as regional centers) and small towns (as local strongholds for urbanization) to implement the so-called stronghold-based urbanization. The ultimate goal of urbanization in West China is to actively adjust and re-arrange various economic development factors and population over the limited expandable spaces to achieve an ecological urban development mode that is within the local carrying capacity hence sustainable.

## *4.2.2 New Pyramid-Like Spatial Organization in the Future*

### 4.2.2.1 Moderately Increase the Number of Cities with an Additional 100–120 in the Future

With large amount of population, seemingly large land territory but relatively restricted habitable areas, China's urbanization situation is very different from that of the relatively developed and urbanized nations in North America and Europe. There is very little experience that can be leant from. Overall, we must admit that the total number of cities in China is still on the lower end with more potential lands that can be further developed. Empirical studies have shown that when population in a city reaches around 2 million people, utilization of the urban infrastructure and public facilities reaches the most efficient level. This is to say that cities with around 2 million residents experience the highest efficiency and lowest occurrence of various urban diseases. From this simple calculation, if total population in China reaches 1.5 billion people in 2030, the entire country shall have around 750 cities (based on the projected urbanization level then). Using threshold analysis and scale-bit sequence rule analysis, we estimate that with around 770–800 cities in 2030, China's urban system will reach a relatively reasonable and efficient development status. Based on these analyses, we propose the following suggestions.

1. Add 25 prefecture-level cities. In 2013 there were 286 prefecture-level cities in China. There were 14 districts, 30 ethnic autonomous prefectures and three national leagues that were not concerted to prefecture cities. Adding the 25 prefecture-level cities will mainly be extracted from these 47 prefecture level administrative units. After comprehensive consideration of the urban population concentration of the locations where the prefecture governments stationed, their economic development level, infrastructure serving capability, ethnic composition, and other conditions, in the future, when the conditions permit, we can change the following prefecture administrative units to be cities. These include (all prefecture-level) Hami, Kashgar, Aksu, Hotan, Altay, Turpan, Xilin Gol League, Hing'an League and Yanbian Korean Autonomous Prefecture,

Bayinguoleng Mongol Autonomous Prefecture, Liangshan Yi Autonomous Prefecture, Ili Kazak Autonomous Prefecture, Chuxiong Yi Autonomous Prefecture, Dali Bai Autonomous Prefecture, Changji Hui Autonomous Prefecture, Southwest Guizhou Buyi and Miao Prefecture, Linxia Hui Autonomous Prefecture, Southeast Guizhou Miao and Dong Autonomous Prefecture, Enshi Tujia and Miao Autonomous Prefecture, Xiangxi (West Hunan) Tujia and Miao Autonomous Prefecture, Honghe Hani and Yi Autonomous Prefecture, South Guizhou Buyi and Miao Autonomous Prefecture, Wenshan Zhuang and Miao Autonomous Prefecture, Xishuangbanna Dai Autonomous Prefecture, and Dehong Dai and Jingpo Autonomous Prefecture.

2. Add 85 new county-level cities. In 2013 there were 370 county-level cities, 1445 counties and 49 Banners. According to the standards (set in 1993) of a county-level city that population must be less than 100,000, urbanization level lower than 40 %, and evaluation of their population concentration, economic income, and basic public service and infrastructure, there will be 100 counties that will meet the standards to become county-level cities. Considering the ethnic factors, for the 117 ethnic autonomous counties with less than 60,000 urban population, and urbanization level less than 25 %, after evaluating their population concentration index, economic income index and basic public service index, and excluding poverty counties, counties that require financial subsidies and counties that are within provincial level municipalities' jurisdictions, we suggest change 10 ethnic autonomous counties to be county-level cities. This amounts the total number of counties that are qualified to become county-level cities to 110. After excluding 25 counties that will be promoted to prefectures, the actually newly added county-level cities will be 85. County-level cities will increase from 370 in 2013 to 455 in 2030.
3. The total amount of newly added cities will be 110. By 2030, the total number of cities will be around 770. Among them, the number of provincial level cities remains unchanged, 4. Prefecture-level cities will be 311. County-level cities will be 455. This will eventually form a pyramid like urban hierarchical structure in China by 2030, at least from an administrative perspective.

#### 4.2.2.2 Properly Increase the Standards for City Size Classification

Since China's city sizes are generally on the larger side, using the amount of permanent residents in the city proper who share urban infrastructure and public service facilities, we can increase appropriately the classification standards for different size of cities. Specifically, we classify Chinese cities into six classes, namely, super cities (more than 10 million residents), mega cities (5–10 million), large cities (1–5 million), medium-sized cities (500,000–1 million), small cities (100,000–500,000), and small towns (less than 100,000). For each different class, there shall be different and corresponding standards for infrastructure and public

service facilities. Spatially, China's urban system will be a pyramid-like structure, composing of urban agglomerations, super cities, mega cities, large cities, medium-sized cities, small cities and small towns. Based on the Overall New Urban Development Guidance, and the permanent residents within city proper data obtained from the sixth census, by 2030, China' will have a new pyramid-like urban system with 20 urban agglomerations, 10 super cities, 20 mega-cities, 150 large cities, 240 medium-sized cities, 350 small cities and 19,000 small towns (Table 4.9 and Fig. 4.6) [12]. The planned spatial distribution is illustrated in Fig. 4.7.

It is hence suggested that the state provides macro guidance for the final scale of each city based on the new urban scale and structure system. Urban planning and construction departments and relevant sectors shall set clear and rigid size constraints to prevent cities from growing beyond limits [13], so that they can provide scientific guidance for local planning and construction from a national urbanization security perspective.

#### 4.2.2.3 Strict Control the "Two Bigs" (Super and Mega Cities), as They Are the Hardest Hit Areas for Urban Diseases

In China, super cities (more than 10 million residents) and mega cities (5–10 million residents) are the hardest hit areas for urban diseases. On the other hand, during the past decade, the contribution to national urbanization of these "two Bigs" (super and mega cities) rose from 4.13 % in 1990 to 12.83 % in 2010. This is often accompanied by increasingly severe urban diseases. As of right now, without exception, all the super and mega-cities were hardest hit by urban diseases. In some cases, the urban diseases even reached incurable point [14]. Under such circumstances, the "two Bigs" shall no longer be treated as important bases for absorbing population under the New Urbanization strategy. Instead, various measures shall be taken to strictly control the population size and the amount of constructed land use in the "two Bigs." In the meantime, it is necessary to diffuse population and industries from the "two Bigs" to their neighboring places, so that their urban diseases can be alleviated to a level that the current residents can tolerate and accept, and can enjoy normal commute, work and life again. The goal of strictly controlling the "two Bigs" is to limit the number of super cities within 10, and mega cities within 20, and their combined contribution to China's urbanization shall be limited within 10 %.

#### 4.2.2.4 Activate the "Two Smalls" (Small Cities and Small Towns), They Shall Be the First Choice for Urbanizing Farmers

By encouraging the development of small cities and small towns, we shall ensure that by 2030, the contribution of small cities and small towns to China's urbanization will reach about 50 %. Three specific strategies can be implemented to encourage the development of the "two Smalls." First, small cities shall be the first

**Table 4.9** New patterns and structure of urban planning and development by 2030

| City size | Classification criteria | Number of cities in 2010 | Number of cities in 2030 | 2030 |
|---|---|---|---|---|
| Urban agglomeration | ≥20 million | 20 | 20 | Yangtze River Delta, Pearl River Delta, Beijing- Tianjin-Hebei, Middle Yangtze River, Chengdu-Chongqing, Central and South Liaoning, Shandong Peninsula, West of Taiwan Strait, Central Plain, Harbin-Changchun, Jianghuai, Guanzhong, Southern Guangxi, Central Shanxi, Hohhot-Baotou-Ordos-Yulin, Central Guizhou, Central Yunnan, Lanzhou-Baiyin-Xining, North Slope of Tianshan Mountain, Ningxia Yellow River |
| Super cities | ≥10 million | 3 | 10 | Shanghai, Beijing, Tianjin, Guangzhou, Chongqing, Shenzhen, Wuhan, Nanjing, Xi'an, Chengdu |
| Mega-city | 5–10 million | 8 | 20 | Hangzhou, Dongguan, Foshan, Shenyang, Harbin, Shantou, Jinan, Zhengzhou, Dalian, Suzhou, Changchun, Qingdao, Kunming, Xiamen, Ningbo, Nanning, Taiyuan, Hefei, Changzhou, Changsha |
| Large city | 1–5 million | 113 | 150 | Tangshan, Zhongshan, Xuzhou, Wenzhou, Guiyang, Urumqi, Wuxi, Zibo, Fuzhou, Shijiazhuang, Huai'an, Lanzhou, Linyi, Nanchang, Huizhou, Yantai, Yangzhou, Wulanchabu, Nantong, Haikou, Weifang, Zaozhuang, Xiangyang, Hohhot, Baotou, Jilin, Putian, Luoyang, Taizhou, Nantong, Jiangmen Nanyang, Huainan, Datong, Tai'an, Fuyang, Bayannaoer, Anshan, Quanzhou, Daqing, Suzhou, Lu'an, Yancheng, Zhanjiang, Fushun, Zhuhai, Qiqihar, Shangqiu, Guigang, Changde, Handan, Baoji, Suqian, Liuzhou, Yichang, Bozhou, Luzhou, Mianyang, Heze, Chifeng, Jining, Rizhao, Wuhu, Laiwu, Suining, Luohe, Huzhou, Yinchuan, Zigong, Neijiang, Yiyang, Yueyang Xinyang, Liaocheng, Maoming, Leshan, Jiaxing, Zhenjiang, |

(continued)

**Table 4.9** (continued)

| City size | Classification criteria | Number of cities in 2010 | Number of cities in 2030 | 2030 |
|---|---|---|---|---|
| | | | | Qinzhou, Xining, Tianshui, Jingzhou, Anyang, Hengyang, Pakistan in Huaibei, Baoding, Zunyi, Benxi, Fuzhou, Jinhua, Zhangjiakou, Yulin, Zhuzhou, Lianyungang, Ezhou, Xinxiang, Yichun, Pingdingshan, Qinhuangdao, Jinzhou, Huludao, Wuwei, Yongzhou, Hezhou, Dongying, etc. |
| Medium-sized cities | 500,000–1 million | 106 | 240 | |
| Small city | 100,000–500,000 | 427 | 350 | |
| City subtotal | | 657 | 770 | |
| Small towns | <100,000 | | 19,000 | |
| Total | | 20 urban agglomerations + 770 cities + 19,000 small towns = new pattern of China's urban systems | | |

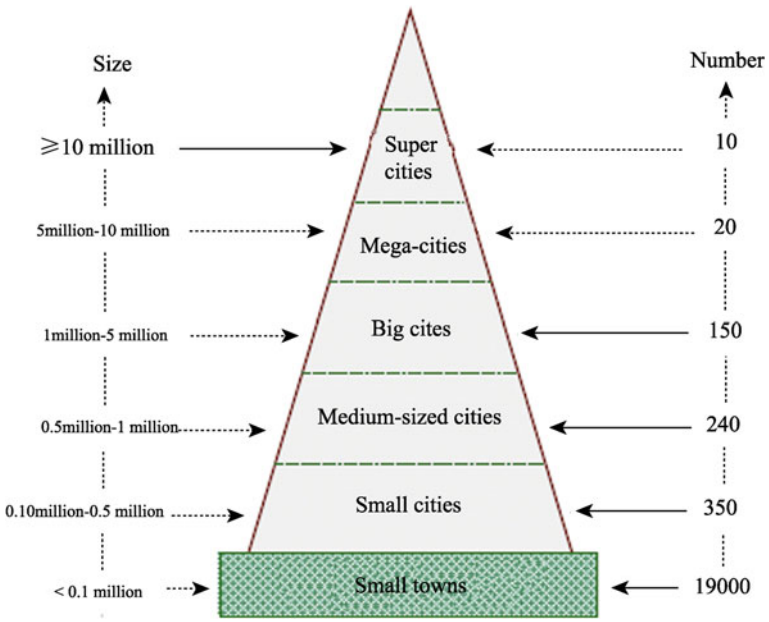


**Fig. 4.6** The pyramid-like urban hierarchical structure in China

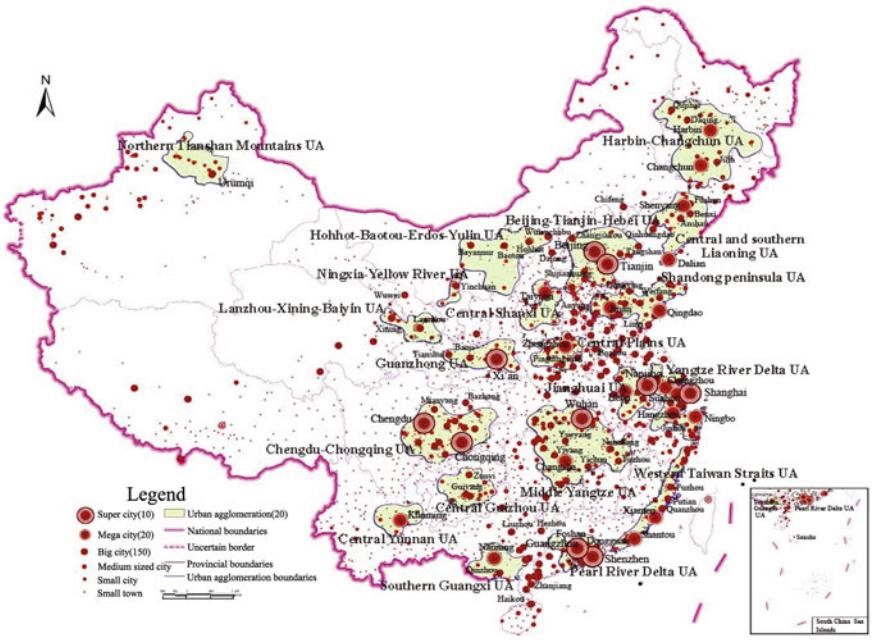


**Fig. 4.7** New patterns of spatial distribution of China's urban size structure in the future

choice for orderly urbanizing farmers with low cost. From statistics, small cities with less than 200,000 residents in the city proper decreased from 291 in 1990 to 162 in 2010. Accordingly, the amount of residents living in small cities dropped from 42.66 to 24.30 million, and their contribution to China's urbanization dropped from 10.72 to 3.63 %. Yet from a sustainable perspective, small cities are supposed to be the most suitable choice for urbanizing farmers and especially absorbing rural surplus labor force due to their relatively large resources and environment carrying capacities, low cost and low threshold of urbanization [15]. To make sure that small cities can take up to their potential in the New Urbanization implementation, the first thing that can be done is to convert some small towns that have reached the standards to be small cities administratively. By 2030, we shall have 350 small cities as compare to 163 in 2010, and small cities' contribution to China's urbanization shall reach 15 %. Second, small towns shall be regarded as another important first choice for urbanizing farmers locally. From the statistics we can see that the number of China's small towns had increased from 12,084 in 1990 to 19,683 in 2011. Their contribution to China's urbanization, however, dropped from 50.2 % in 1990 to 36.44 % in 2010. Again, small towns are actually the most ideal locations for urbanizing farmers and transferring local surplus labor force since they have relatively large resource and environment carrying capacity, and the lowest

cost and lowest threshold of urbanization. To make sure that small towns live up to their potential in the national New Urbanization strategy, we need to convert villages that meet the standards of small towns to township administrative level, or merge different villages to set up townships. Our goal is to ensure the by 2030, there will be around 19,000 small towns, and their contribution to the national urbanization maintains at 35 %. Third, it is important to devise and implement a series of preferential policies to support industrial development in small cities and towns, put great efforts to bring employment opportunities via industrial and service transfers [16]. Although in general, there are more employment opportunities in the "two Bigs," the costs of urbanization farmers in these super and mega cities are prohibitively high. Housing and schooling are much more difficult than in small cities and towns for farmers. In addition, as the urban diseases in the "two Bigs" won't go away in short period of time, it is highly improbable for migrant workers to obtain stable and safe permanent houses. In small cities and towns, however, prices for housing and living necessities are much lower; hence the threshold for urbanizing farmers is much lower as well. Newly urbanized farmers can obtain stable and permanent housing fairly easily, which could also encourage modern development for rural areas as well. As long as preferential policies that direct governmental supportive industries and employment opportunities to transfer to small cities and towns, they can become significant locales for absorbing surplus rural labor forces hence attracting rural population to support New Urbanization [17].

### *4.2.3 Establishing Ethnic Autonomous Municipalities and Embedding into National New Urbanization Pattern*

From the perspective of accelerating urbanization process in ethnic minority regions, conforming to the adjusted criteria for the classification of city sizes, we suggest adding a layer of establishment of ethnic autonomous municipality in the current administrative hierarchy. In so doing, we will have three different municipal administrative levels, namely, provincial level municipalities, prefecture municipalities and corresponding ethnic minority autonomous municipalities, county-level municipalities and corresponding ethnic minority autonomous municipalities. Whenever a county level administrative unit reaches the standard of municipality, we shall convert it to be such. From the strategic goal of accelerating the establishment of a moderately prosperous society, and global urbanization development, under the permission of ethnic minority autonomous regulation, we propose the following three strategies to establish ethnic minority municipalities.

First, we shall attempt to find appropriate ones from the 30 ethnic minority autonomous prefectures that have met the set criteria for establishing prefecture-level municipalities. We shall then convert them to be prefecture level

ethnic autonomous municipalities so that they can partake in the grand plan for national urbanization development.

Second, again, we shall attempt to locate appropriate ones in the 120 ethnic minority autonomous counties that meet set criteria of county-level municipalities and convert them to be county-level ethnic minority municipalities. In so doing, they can also quickly partake into the grand plan for national urbanization development.

Third, we shall actively explore different development modes for the 5 provincial level, 30 prefecture level, and more than 120 county-level ethnic minority autonomous regions. Such development modes will take into consideration the unique characteristics of the ethnic minority autonomous regions, such as household registration system, family planning policies, characteristic urbanization approach, integrated urban and rural development, and implementation of ethnic minority policies, so that the development modes can be adapted successfully in those ethnic minority autonomous regions to facilitate their participation in the national urbanization grand plan.

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# Chapter 5
# Comprehensive Regionalization for China's New Urbanization Development

Regional differences in the current and future urbanization development in China are substantial. In regard of that, promoting New Urbanization in China shall not follow a universal approach. Instead, such a development must objectively adhere to location and category-specific principles and adopt differentiated urbanization development models [1]. Comprehensive regionalization is often used in geography to better understand regional differentiation and provide location-based strategies for regional development. Such approach, however, is rarely deployed in research addressing human and social problems relating to urbanization. In March 2014, China published the National New Urbanization Plan (2014–2020), which calls for scientific and reasonable planning of New Urbanization in which appropriate comprehensive regionalization could play a significant role. Specifically, comprehensive regionalization will first categorize regions with similar development conditions, foundations, goals, and modes, and then generate targeted development strategies, goals, modes, and paths for each category. In particular, our regionalization plan uses the six current regionalization categories, namely, primary New Urbanization region, food production region, agricultural, forestry, and pastoral mixed region, poverty contiguous region, ethnic autonomous region, and national key ecological function region, as the classification basis for New Urbanization. By employing principal component analysis, clustering analysis, and overlay analysis (the quantitative analysis), combined with the national main function area planning, China's ecological regionalization, China's comprehensive agricultural regionalization, and China's urban agglomeration pattern (the qualitative analysis), we determined five top-level New Urbanization regions, namely, urban agglomeration region, food production urbanization region, agricultural, forestry, and pastoral mixed urbanization region, poverty contiguous urbanization region, and ethnic autonomous urbanization region. Among the 5 top-level regions, there are 47 urbanization subregions. Our study discusses the features and key problems for



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each region. This study for the first time introduces a regionalization practice for New Urbanization. Such practice fills the gap of providing regionalization for New Urbanization in China, enriches the theoretical studies of New Urbanization, and provides invaluable reference for healthy and sustainable urbanization in China.

## 5.1 Foundation and Process for Comprehensive Regionalization of China's New Urbanization

### *5.1.1 Research Progress on Comprehensive Regionalization for New Urbanization*

Regionalization is a traditional and important work of geography research [2]. The founder of Regional School of Geography, Hettner (A1 Hettner), noted that the "region" in terms of its concept is a continuous decomposition of the whole entity. A geographic regionalization is a process that keeps decomposing the whole into spatially connected parts. In the meantime, different types of regions can be distributed separately. Nearly a century, since the beginning of the nineteenth century when the founder of modern geography, Humboldt (A.V. Humboldt), pioneered the world isotherm, studies of regionalization in most countries mainly focused on geographical division of natural ecosystems, with little regard to a human beings and how human beings function in an ecosystem. Since the 1920s and 1930s to the end of the twentieth century, in order to reconstruct the postwar urban and regional land space system as well as in response to the sustainable development mission due to rapid industrialization and urbanization, Germany, Japan, Britain, France, and other developed countries began to focus on national comprehensive spatial planning, the differentiation law of their regional systems, and function zoning. The scientific study of regionalization gradually shifted from the natural system to ecosystems and eventually to the coupled social-economic-resources and environment complex system. In those countries, they have established a complete set of spatial planning system at the national and the regional level, and also including various departments. For instance, Germany has its "spatial development planning." France has an "integrated service planning." The UK has a "national planning policy guidelines (PPG: Planning Policy Guidance)." Japan has a "national comprehensive development plan." South Korea has a "comprehensive planning for land construction." [3–5]. Regionalization studies gradually shift from cognitive regionalization to emphasizing on both cognitive and application-oriented regionalization.

Regionalization studies in China have progressed considerably since the 1950s. The study fields have been gradually expanded. Results and types of studies have been enriched. Study approaches have been diversified as well. By a simple search from the most comprehensive knowledge database in China, www.cnki.net, the literature that is related with "regionalization" covers close to 40 subjects, including six different national regionalization types. They are China's physical geography

regionalization (natural regionalization, natural comprehensive regionalization, natural ecological regionalization, meteorological regionalization, agricultural meteorological regionalization, terrain and geomorphology regionalization, hydrological regionalization, soil regionalization, biogeography regionalization (vegetation cover regionalization, and zoogeography regionalization) etc., China's eco-environment regionalization (ecological regionalization, ecological function regionalization, ecological hydrological regionalization, water and soil conservation regionalization, environmental function regionalization, water environment function regionalization, oceanic function regionalization, atmospheric environmental function regionalization, and urban noise environment regionalization, etc.), China's natural disaster regionalization (flood, landslide, and other disasters' danger regionalization, seismic regionalization, etc.), China's economic regionalization (economic regionalization, rural economic regionalization, agricultural regionalization, forestry regionalization, mineral resource regionalization, population regionalization, transportation regionalization, building climate regionalization, arable land protection regionalization, eco-economic regionalization, and eco-tourism regionalization, etc.), China's administrative regionalization (administrative regionalization), China's space management regionalization (main function regionalization, land use regionalization, regional planning, and restricted area regionalization, etc.). Proposing these regionalization types has profound historical background. They are both a scientific generalization of the then studies and closely related with the then socioeconomic development level and demands. From in-depth study of the literature, we can see that prior to 1980, the majority of the regionalization studies focused on physical geographical fields, and served mainly agricultural development. For instance, Zhu Kezhen's "China's Climatological Regionalization" (1929) is the start of China's studies on regionalization [6]. Huang Binwei's "China's Comprehensive Natural Regionalization" provides the classic methodology for China's comprehensive natural regionalization [7, 8]. During this period, studies on natural regionalization were more fruitful [9–16], but still mainly focused on one single geographic element (land, vegetation, climatology, etc.). In the meantime, studies on economic and social regionalization remained relatively weak. Although China had introduced the regionalization and planning theories from the former Soviet Union, theoretical and practical research on regionalization and planning remained stagnant after 1990 [17]. On the other hand, in the 1980s, as China's socioeconomic system experienced deepened reform and rapid development, studies on economic regionalization (including land use planning and regional planning) had grown significantly due to the demand of national development [18]. Studies such as the National Land Planning Outline, Regional Land Planning (prepared by the State Planning Committee), China Regional Development Theory under the theoretical guidance of "Point-Axis" theory, China's economic regionalization [19], China's rural economic regionalization [20] had made great progress. During this period of transition, China's economic regionalization was somewhat mixed with planned economy, hence the national economy division was dominated by a mixture of planned, regionalized, and

planning activities. The object of regionalization started to shift from the early fuzzy economic system to the actual physical geographic space. In 1992, the Chinese-characterized market economy was established in China. The uncertainty of the markets made the "planned" regionalization of the planned economy era harder to be implemented, which called for new transition of economic regionalization. In 1998, China's regionalization theories and practices started to diversify. Physical geographers started to explore the possibilities to integrate human beings into natural regionalization studies to develop comprehensive regionalization [2, 21, 22, 23]. The development of our understanding of the eco-environment also promoted a national guidance ecological function regionalization to be issued in 2002. Since 2006, as China started to focus on a series of mistakes during China's regional development, the promotion of scientific development, and the so-called "five balanced" development becoming the mainstream thoughts, a series of influential national-level regionalization case studies were proposed, which enables great progress of China's regional planning as well. At the same time, the national main function regions were created and become new members of China's regionalization. After 2010, as China entered a fast-paced urbanization growth stage, rapid urbanization faced the challenges of connotative transition, ecological civilization, and New Urbanization planning with the central government setting the bottom line and red line from both the strategic and tactic levels. The purposes of regionalization also shifted to serve sustainable New Urbanization development under the background of globalization and ecologic civilization.

Overall, with the transformation and upgrading of China's economic development and urbanization, China's comprehensive regionalization practices is gradually transferring from comprehensive natural regionalization to comprehensive economic regionalization. We must admit that the various regionalization practices in the past had played crucial roles in protecting China's eco-environment and promoting its socioeconomic development at certain historical stages. These practices, however, paid rather limited attention to the regionalization for "people-oriented" urbanization. The *National New Urbanization Planning* (*2014–2020*) issued by the State Council in March 2014, specifically proposed that we must implement differentiated urbanization development mode under local conditions [1]. To do so, we need first a complete set of scientifically reasonable comprehensive regionalization plans for New Urbanization. Apparently, actively promoting comprehensive regionalization studies for New Urbanization is the strategic necessity for scientifically implementing the *National New Urbanization Planning* (*2014–2020*). It is also a realistic demand for promoting the 62 experimental locales of exercise New Urbanization strategies. Such studies can fill in the gaps of national New Urbanization regionalization, enrich and complete China's comprehensive regionalization system, provide better guidance to implement the *National New Urbanization Planning* (*2014–2020*), and promote local-conditions-respecting, sustainable, and healthy development of New Urbanization in various regions. The studies will also contribute significantly to China's urbanization security, food security, ecological security, and sociopolitical stability.

### 5.1.2 Qualitative Foundation and Path for Comprehensive Regionalization

Based on the previous regionalization practices, we chose the five types of regions, namely, the primary region for New Urbanization, food production region, agricultural, forestry, and pastoral mixed region, poverty contiguous region, and ethnic autonomous region, as the bases for regionalizing the different types of urbanization in China. The national key ecological function regions are not included in the regionalization plans for New Urbanization so that they can continue to provide ecological and environmental functions. In the meantime, based on the current urbanization level and predicted future levels, from a qualitative perspective, we regionalize China's New Urbanization into five comprehensive development regions, namely, the primary urbanized region, food production region, agricultural, forestry, and pastoral mixed region, poverty contiguous region and ethnic minority autonomous region (Table 5.1 and Fig. 5.1). Within each region, there are a few subregions. To ensure the protection of national key ecological function regions, the regionalization plans must respect the current regionalization designation for ecological function areas. Any regionalization of urbanization must strictly exclude areas that belong to national key ecological function region.

**Table 5.1** Thoughts of China's comprehensive regionalization of New Urbanization

| No. | Basis | Priority | Name of regionalization | Urbanization level | Target |
|---|---|---|---|---|---|
| 1. | Urbanization | First | Urban agglomeration area urbanization development regions (I) | Very high | Improve quality |
| 2. | Food production | Second | Major food-producing area urbanization development regions (II) | High | Improve speed |
| 3. | Agriculture, forestry and pastoral area | Third | Agriculture, forestry, and, pastoral area urbanization development regions (III) | Middle | Integrated development |
| 4. | Poverty contiguous | Fourth | Poverty contiguous area urbanization development regions (IV) | Low | Increase income |
| 5. | Ethnic minority autonomous | Fifth | Ethnic minority autonomous area urbanization development regions (V) | Very low | Stable |

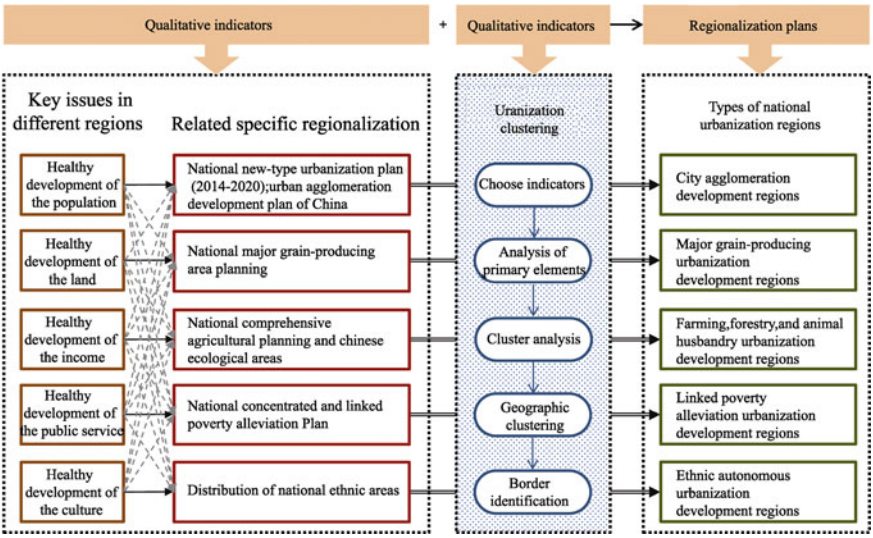


**Fig. 5.1** Methods and ideas for designing a comprehensive regionalization plan for New Urbanization in China

#### 5.1.2.1 The First Priority Region: The Primary Urbanized Regions for Development of Urban Agglomerations

Using the *National Primary Function Area Planning* and *National New Urbanization Planning (2014–2020)* as the macro guidelines, following the distribution of China's urban agglomeration spatial organization pattern [24], we shall choose the highly urbanized regions as the key regions for future urbanization. These regions are regions that either are currently or will eventually develop to urban agglomerations. These regions are the primary spatial units for China's New Urbanization. These regions will be categorized based on which urban agglomerations they belong to. They are the regions that will lead China's New Urbanization development and the first priority regions for urbanization. As of now, there are 20 urban agglomerations with different sizes and different developing states [25] (also see Chap. 4 for details). They are the highest and most developed urbanized regions in China today.

#### 5.1.2.2 The Second Priority: Food Production Regions and Their Urbanized Areas

After the regions for urban agglomerations are designated, based on China's Comprehensive Agricultural Regionalization Program and National Food Production Spatial Distribution, we delineate China's primary food production areas, and propose the second urbanization priority is urbanization in food

production areas. We specifically propose that urbanization in these regions must ensure China's food security. The primary purpose for these regions is food security; implementing New Urbanization is the secondary purpose. Urbanization levels in these regions are relatively high.

#### 5.1.2.3 The Third Priority: Urbanization Regions in the Agricultural, Forestry, and Pastoral Mixed Regions

After the first and second priority regions have been identified, we continue to use China's Comprehensive Agricultural Regionalization Program and National Food Production Spatial Distribution, combined with the production conditions in agricultural, forestry, and pastoral mixed regions and their physical geographic foundations, to propose urbanization regions in agricultural, forestry, and pastoral mixed regions. This is the third priority region for implementing New Urbanization strategies. The primary goal of urbanization in this region shall focus on integrated rural and urban development. Integrated rural and urban development shall be the primary purpose for this region's urbanization. Their urbanization level is at the medium level.

#### 5.1.2.4 The Fourth Priority: Urbanization in Poverty Contiguous Regions

After the previous three priority regions, based on the national poverty contiguous regional planning and spatial distribution, we propose New Urbanization in poverty contiguous regions, and clearly indicate that the primary purpose for urbanization in these regions is to reduce poverty. This is the fourth priority urbanization region. Reducing poverty and eventually developing these regions are the top goals for urbanization in these regions. Urbanization level there is at a relatively low level.

#### 5.1.2.5 The Fifth Priority: Urbanization in Ethnic Autonomous Regions

After the previous four priority regions, based on the spatial distribution of national ethnic minority autonomous region, fully taking into consideration the specific requests of the 5 provincial-level, 30 prefecture-level and 120 county-level ethnic minority autonomous regions, we propose urbanization regions in ethnic minority autonomous regions to fully integrate the ethnic minority regions into the national New Urbanization strategical plans. This is the fifth priority region (or rather, the fifth category as this priority does not indicate any ranking connotations). For instance, urbanization shall be strengthened and supported in these regions such as Tibetan autonomous areas, Hui autonomous region, Mongolia autonomous regions,

Korean autonomous regions, Zhuang autonomous region, Uygur autonomous region, and Tujia autonomous region. The primary goals of urbanization in ethnic minority autonomous regions are to ensure prosperity and stability of these regions. Urbanization levels might vary based on the historical development of the various regions within this category.

## 5.2 Principles and Approaches of Comprehensive Regionalization for New Urbanization

### *5.2.1 Principles of Comprehensive Regionalization for New Urbanization*

This study first sets out a series of principles for New Urbanization regionalization. Details are as follows.

#### 5.2.1.1 Principle of Comprehensiveness

This indicates that regionalization for urbanization must comprehensively consider population allocation, urbanization level, social and economic development conditions, local natural conditions, and the nature and development direction of cities. In addition, regionalization must also consider the similarity and differences, and the degrees of such similarity and differences of regional characteristics.

#### 5.2.1.2 Principle of Dominance

Regionalization must consider various aspects of the regions under consideration (as per the principle of comprehensiveness). To ensure successful regionalization, we must identify one or a few dominant elements that characterize the region. The principle of dominance does not mean that other aspects are not important in regionalization, but the one or a few elements might best separate regions apart, while other elements still plays significant roles in defining the region.

#### 5.2.1.3 Principle of Consistency

Consistency refers mainly to the dominant elements of regions during regionalization. For instance, regions that are categorized together must be in general consistent in regional development environment, development directions, or urbanization level, etc.

#### 5.2.1.4 Principle of Regional Continuity

This principle basically indicates that regionalization must not create scattered pattern of regions. Each category of the regionalization must be spatially continuous. Even if some small patches of region within showing relative dissimilarity, they shall still be considered part of the larger region.

#### 5.2.1.5 Principle of Agreement with Administrative Regionalization

This often refers to either when the boundaries between two specific regions are fairly complex or the differences between them are not prominent but there are administrative boundaries, regionalization boundaries in such case shall consider adapting to administrative boundaries.

### *5.2.2 Research Approaches for Comprehensive Regionalization for New Urbanization*

Based on analyzing the factors affecting the development of China's urbanization, we choose 13 primary indicators, namely, per capita GDP, per capita investment, the proportion of manufacturing employees, the proportion of employees of producer services, the proportion of employees of consumer services, average years of education, the proportion of professional and technical personnel, per capita revenue, the proportion of migrants, number of hospital beds per 10,000 people, welfare programs per 10,000 people, distance to the railway, the terrain undulation, and water abundance, to conduct a principal component analysis. The results of principal components analysis are then used for cluster analysis, and clustering results are mapped with Arc GIS 10.1. Finally, combined with the spatial pattern of China's urban agglomerations, comprehensive agricultural regionalization, main function area planning, and ecological regionalization, we attempt to provide a proposal for a comprehensive urbanization regionalization.

The data for comprehensive regionalization are obtained from the "China Statistical Yearbook" (2013), "National main functional area planning," "national New Urbanization plan (2014–2020)," "national food security and medium to long-term Plan (2008–2020)" "China's Rural Poverty Alleviation and Development Outline (2011–2020)," China's urban agglomeration development plan, China's comprehensive natural regionalization, China's comprehensive agricultural regionalization, and China's ecological regionalization.

#### 5.2.2.1 Principal Component Analysis

Data for the selected 13 indicators across all the regions were fed into SPSS 19.0 for principal component analysis. The five principal components with eigenvalues over

**Table 5.2** Eigenvalues and variance contribution rate

| Principal components | All principal components | | | The retained principal components | | |
|---|---|---|---|---|---|---|
| | Eigenvalues | % | Cumulative % | Eigenvalues | % | Cumulative % |
| 1 | 4.855 | 34.682 | 34.682 | 4.855 | 34.682 | 34.682 |
| 2 | 2.183 | 15.596 | 50.277 | 2.183 | 15.596 | 50.277 |
| 3 | 1.332 | 9.517 | 59.794 | 1.332 | 9.517 | 59.794 |
| 4 | 1.199 | 8.562 | 68.356 | 1.199 | 8.562 | 68.356 |
| 5 | 1.003 | 7.162 | 75.518 | 1.003 | 7.162 | 75.518 |
| 6 | 0.719 | 5.135 | 80.653 | | | |
| 7 | 0.631 | 4.506 | 85.159 | | | |
| 8 | 0.508 | 3.632 | 88.791 | | | |
| 9 | 0.345 | 2.461 | 91.252 | | | |
| 10 | 0.310 | 2.212 | 93.464 | | | |
| 11 | 0.291 | 2.077 | 95.541 | | | |
| 12 | 0.226 | 1.615 | 97.157 | | | |
| 13 | 0.220 | 1.574 | 98.731 | | | |
| 14 | 0.178 | 1.269 | 100.000 | | | |

**Table 5.3** Retained principal component loading matrix

| Indicators | Principal components | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| Per capita GDP | 0.771 | −0.130 | −0.083 | 0.441 | −0.056 |
| Per capita investment in fixed assets | 0.638 | 0.105 | −0.207 | 0.551 | 0.069 |
| Proportion of manufacturing employees | 0.460 | −0.464 | 0.477 | −0.086 | −0.033 |
| Proportion of producer services employees | 0.790 | −0.126 | 0.221 | −0.333 | −0.048 |
| Proportion of consumer services employees | 0.692 | 0.382 | 0.083 | −0.328 | 0.050 |
| Average years of education | 0.593 | −0.424 | −0.372 | −0.303 | −0.052 |
| Proportion of professional and technical personnel | 0.780 | 0.314 | −0.005 | −0.317 | 0.016 |
| Per capita revenue | 0.814 | 0.001 | 0.010 | 0.447 | −0.053 |
| Proportion of the migrants | 0.810 | 0.136 | 0.223 | 0.033 | −0.184 |
| Number of hospital beds per 10 thousand people | 0.464 | 0.354 | −0.320 | −0.228 | 0.272 |
| Number of welfare beds per 10 thousand people | 0.107 | −0.216 | 0.172 | 0.075 | 0.932 |
| Distance to the railway | 0.012 | 0.634 | −0.349 | −0.051 | 0.083 |
| Terrain | −0.155 | 0.852 | 0.117 | 0.129 | −0.012 |
| Water Resources Abundance | −0.091 | 0.426 | 0.737 | 0.065 | 0.014 |

1 (as per convention) were retained (Table 5.2). These five principal components explained accumulatively 75.58 % of the total variance. We deem it appropriate to approximate the original 13 indicators with these five principal components. By examining the loadings of these five principal components (Table 5.3), we designate these components as socioeconomic component, terrain component, water resource component, per capita fixed asset investment component, and welfare component. Their contributions are 34.68, 15.60, 9.52, 8.56, and 7.16 %, respectively.

#### 5.2.2.2 Cluster Analysis

After obtaining the five principal components, they were further analyzed using cluster analysis in SPSS. The initial clustering analysis clustered all the regions to 5–11 different clusters. After visualizing the various clusters in ArcGIS, we determined that a five-cluster scenario is more appropriate and agrees with the current urbanization level in China well (Fig. 5.2). The regionalization approach for urbanization using principal component analysis and cluster analysis with relevant indicators satisfies the principles of comprehensiveness, and dominance. Such

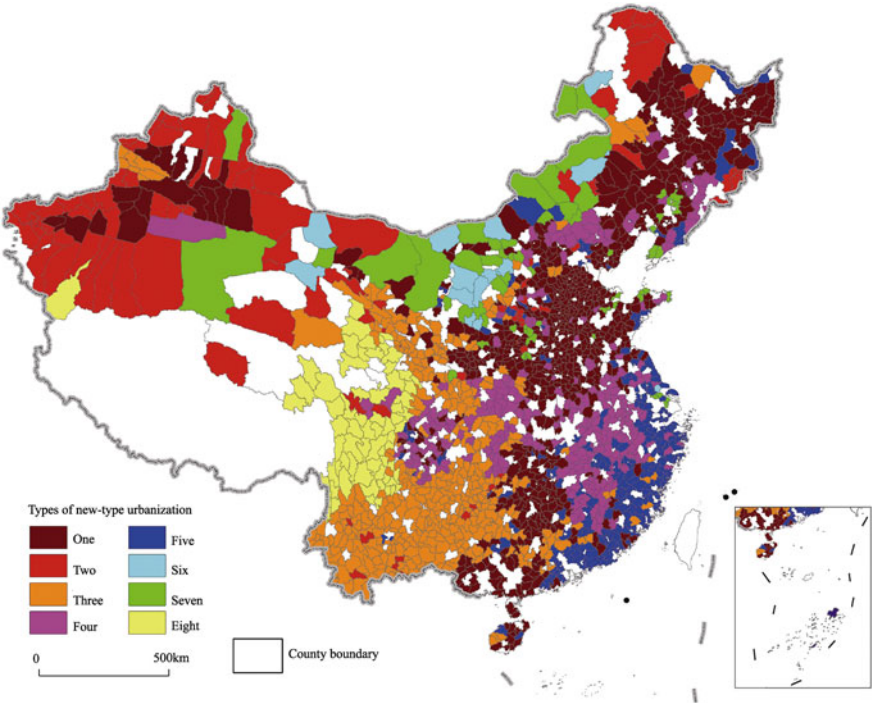


**Fig. 5.2** Cluster analysis results for China's urbanization development regionalization

approach, however, falls short on the principles of consistency and regional continuity for a comprehensive regionalization. For instance, there are quite a few counties that are clustered to other categories different than their background category. For this matter, the current approach for urbanization regionalization needs to be adjusted combining with administrative boundaries, classification boundaries of other relevant planning and regionalization.

## 5.3 The Basic Schemes and Promoting Approaches for Comprehensive Regionalization for New Urbanization

### *5.3.1 The Basic Schemes for Comprehensive Regionalization for New Urbanization*

As per our previous discussion, the basic schemes for comprehensive regionalization for New Urbanization are determined via first identifying the six general categories of regions, namely, primary urbanized region, food production region, agricultural, forestry, and pastoral mixed use region, poverty contiguous region, ethnic autonomous region, and national key ecological function region. After the six general categories of regions are identified, we applied principal component analysis, cluster analysis, and overlay analysis, by collectively considering National Main Functional Area Planning, China's ecological regionalization, comprehensive agricultural regionalization, and spatial patterns of China's urban agglomerations, to eventually regionalized five grand categories of regions and 47 subregions for urbanization (Fig. 5.3). The five grand categories of urbanization regions are urban agglomeration area urbanization development regions (I), food production area urbanization development region (II), agricultural, forestry, and pastoral mixed used area urbanization development region (III), poverty contiguous area urbanization development region (IV), and ethnic autonomous area urbanization development region (V). The position for each grand category in China's urbanization is shown in Table 5.4, and position for each subregion is show in Table 5.5.

#### 5.3.1.1 Urban Agglomeration Area Urbanization Development Region (I): 20 Sub-regions

1. Basic composition: Urban agglomeration area urbanization development region (I) is the primary area for China's New Urbanization. This region is composed of 5 national-level urban agglomerations, 9 regional-level urban agglomerations, and 6 subregional urban agglomerations [26]. Specifically, this region includes 20 subregions, namely, Beijing-Tianjin-Hebei Urban Agglomeration $I_1$, Yangtze River Delta Urban Agglomeration $I_2$, Pearl River Delta Urban Agglomeration $I_3$,

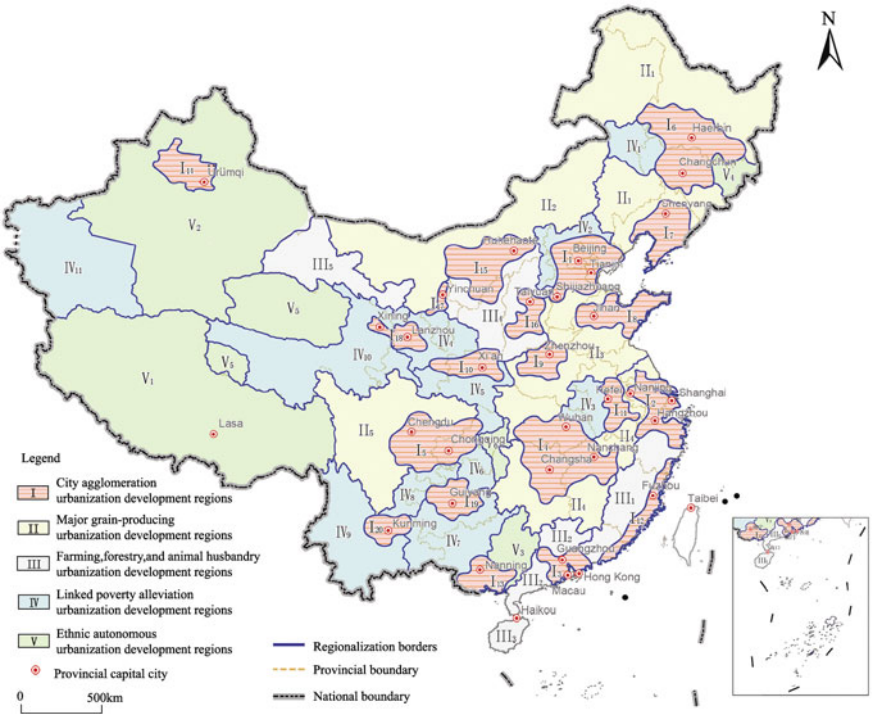


**Fig. 5.3** Comprehensive regionalization plan for China's New Urbanization

Middle Yangtze River Urban Agglomeration $I_4$, Chengdu-Chongqing Urban Agglomeration $I_5$, Harbin-Changchun Urban Agglomeration $I_6$, Central and South Liaoning Urban Agglomeration $I_7$, Shandong Peninsula Urban Agglomeration $I_8$, Central Plain Urban Agglomeration $I_9$, Guanzhong Urban Agglomeration $I_{10}$, Jianghuai Urban Agglomeration $I_{11}$, West of Taiwan Strait Urban Agglomeration $I_{12}$, Southern Guangxi Urban Agglomeration $I_{13}$, North Slope of Tianshan Mountain Urban Agglomeration $I_{14}$, Hohhot-Baotou-Ordos-Yulin Urban Agglomeration $I_{15}$, Central Shanxi Urban Agglomeration $I_{16}$, Ningxia Yellow River Urban Agglomeration $I_{17}$, Lanzhou-Baiyin-Xining Urban Agglomeration $I_{18}$, Central Guizhou Urban Agglomeration $I_{19}$, and Central Yunnan Urban Agglomeration $I_{20}$ (Table 5.5). Each subregion is the core strategic region for their corresponding provinces or regions, and also the strategic core region for New Urbanization development, and primary carrying region for urbanizing rural population. In the meantime, this region is also the most polluted region that requires intensive treatment.

**Table 5.4** Statistics for the five grand categories of urbanization regions in China (2012)

| Code | Name | Area/ % | Population/ % | Population density/ (persons/km$^2$) | Urban population/ % | Urbanization level/% | GDP/ % | Economic density/ (10,000 RMB Yuan/km$^2$) |
|---|---|---|---|---|---|---|---|---|
| I | Urban agglomeration area | 25.82 | 62.83 | 339.87 | 78.42 | 45.43 | 80.57 | 1420.5 |
| II | Major food production area | 20.8 | 18.97 | 120.65 | 10.02 | 30.43 | 13.02 | 284.91 |
| III | Agriculture, forestry, and pastoral area | 6.21 | 6.77 | 132.65 | 4.73 | 27.16 | 4.12 | 298.53 |
| IV | Poverty contiguous area | 18.25 | 8.82 | 67.48 | 4.04 | 21.91 | 1.13 | 28.18 |
| V | Ethnic minority autonomous area | 28.92 | 2.61 | 12.6 | 2.79 | 36.6 | 1.16 | 18.26 |
| National level | | 100 | 100 | 139.68 | 100 | 34.61 | 100 | 455.25 |

**Table 5.5** Statistics for the 47 subregions of urbanization in China (2012)

| Code | Name | Area/ % | Population/ % | Population density/ (persons/km$^2$) | Urban Population/ % | Urbanization level/% | GDP/ % | Economic density/ (10,000 RMB Yuan/km$^2$) |
|---|---|---|---|---|---|---|---|---|
| **I** | **Urban agglomeration area** | **25.82** | **62.83** | **339.87** | **78.42** | **45.43** | **80.57** | **1420.50** |
| $I_1$ | Beijing-Tianjin-Hubei | 1.90 | 6.30 | 462.77 | 10.11 | 60.48 | 9.06 | 2169.77 |
| $I_2$ | Yangtze River Delta | 1.14 | 6.33 | 772.48 | 11.28 | 66.50 | 16.17 | 6430.00 |
| $I_3$ | Pearl River Delta | 0.58 | 2.25 | 546.01 | 4.71 | 71.83 | 8.62 | 6819.93 |
| $I_4$ | Middle Yangtze River | 2.94 | 8.44 | 401.59 | 8.35 | 36.33 | 7.32 | 1135.07 |
| $I_5$ | Chengdu-Chongqing | 2.50 | 8.07 | 450.08 | 10.32 | 43.86 | 5.31 | 965.17 |
| $I_6$ | Harbin-Changchun | 2.92 | 3.46 | 165.70 | 4.23 | 41.84 | 3.74 | 583.97 |
| $I_7$ | Central and South Liaoning | 1.22 | 2.77 | 317.64 | 4.11 | 52.85 | 4.49 | 1674.91 |
| $I_8$ | Shandong Peninsula | 1.17 | 4.68 | 556.21 | 5.31 | 46.29 | 7.47 | 2896.22 |
| $I_9$ | Central Plain | 0.61 | 3.39 | 773.13 | 3.00 | 30.29 | 3.06 | 2273.18 |
| $I_{10}$ | Guanzhong | 0.93 | 2.19 | 330.07 | 2.05 | 32.02 | 1.58 | 773.44 |
| $I_{11}$ | Jianghuai | 0.74 | 2.27 | 427.28 | 2.73 | 41.25 | 2.02 | 1242.69 |
| $I_{12}$ | West of Taiwan Strait | 0.87 | 3.90 | 625.27 | 3.50 | 39.52 | 4.10 | 2144.65 |
| $I_{13}$ | Southern Guangxi | 0.76 | 1.69 | 312.22 | 0.91 | 38.37 | 0.98 | 587.25 |
| $I_{14}$ | North Slope of Tianshan Mountain | 0.62 | 0.31 | 70.14 | 0.70 | 76.60 | 0.56 | 410.48 |
| $I_{15}$ | Hohhot-Baotou-Ordos-Yulin | 3.08 | 1.11 | 50.43 | 1.25 | 38.52 | 2.35 | 347.61 |
| $I_{16}$ | Central Shanxi | 0.93 | 1.48 | 221.96 | 1.73 | 40.16 | 1.27 | 622.67 |
| $I_{17}$ | Ningxia Yellow River | 0.54 | 0.37 | 93.94 | 0.50 | 46.89 | 0.33 | 279.51 |
| $I_{18}$ | Lanzhou-Baiyin-Xining | 0.79 | 1.04 | 185.18 | 0.92 | 30.46 | 0.57 | 328.48 |
| $I_{19}$ | Central Guizhou | 0.57 | 1.23 | 299.16 | 1.36 | 38.03 | 0.58 | 461.00 |
| $I_{20}$ | Central Yunnan | 1.00 | 1.54 | 215.40 | 1.35 | 36.62 | 0.98 | 444.59 |

(continued)

**Table 5.5** (continued)

| Code | Name | Area/ % | Population/ % | Population density/ (persons/km$^2$) | Urban Population/ % | Urbanization level/% | GDP/ % | Economic density/ (10,000 RMB Yuan/km$^2$) |
|---|---|---|---|---|---|---|---|---|
| **II** | **Major food production area** | **20.80** | **18.97** | **120.65** | **10.02** | **30.43** | **13.02** | **284.91** |
| $II_1$ | Northeast China | 7.30 | 2.08 | 39.90 | 1.75 | 35.33 | 3.91 | 243.73 |
| $II_2$ | Inner Mongolia | 4.81 | 0.12 | 3.62 | 0.13 | 34.61 | 0.85 | 80.07 |
| $II_3$ | Yellow River, Huai River, and Hai River | 3.12 | 11.35 | 508.17 | 5.1 | 27.49 | 4.17 | 608.22 |
| $II_4$ | Middle and lower reaches of Yangtze River | 2.15 | 4.41 | 220.98 | 2.32 | 36.86 | 3.52 | 742.83 |
| $II_5$ | Southwest China | 3.42 | 1.01 | 41.09 | 0.72 | **31**.19 | 0.59 | 77.90 |
| **III** | **Agriculture, forestry, and pastoral area** | **6.21** | **6.77** | **132.65** | **4.73** | **27.16** | **4.12** | **298.53** |
| $III_1$ | Southeast hilly region | 1.35 | 1.96 | 181.02 | 1.35 | 26.31 | 1.15 | 387.67 |
| $III_2$ | South mountain region | 0.84 | **1**.85 | 306.42 | 1.45 | 26.86 | 0.99 | 533.13 |
| $III_3$ | Hainan and south China sea archipelago region | 0.52 | 0.95 | 172.20 | 0.63 | 33.20 | 0.82 | 715.10 |
| $III_4$ | Loess Plateau region | 1.12 | 1.70 | 173.52 | 1.05 | 25.84 | 0.70 | 283.79 |
| $III_5$ | West of Yellow River corridor region | 2.44 | 0.32 | 18.15 | 0.25 | 27.13 | 0.45 | 84.71 |
| **IV** | **Poverty contiguous area** | **18.25** | **8.82** | **67.48** | **4.04** | **21.91** | **1.13** | **28.18** |
| $IV_1$ | South of the Greater Xing'an mountain region | 0.84 | 0.27 | 45.08 | 0.19 | 23.64 | 0.13 | 69.12 |
| $IV_2$ | Yanshan-Taihang mountain region | 0.92 | 0.53 | 80.11 | 0.25 | 24.89 | 0.11 | 53.83 |

(continued)

**Table 5.5** (continued)

| Code | Name | Area/ % | Population/ % | Population density/ (persons/km$^2$) | Urban Population/ % | Urbanization level/% | GDP/ % | Economic density/ (10,000 RMB Yuan/km$^2$) |
|---|---|---|---|---|---|---|---|---|
| $IV_3$ | Dabie mountain region | 0.66 | **1**.74 | 369.92 | 0.54 | 22.49 | 0.09 | 64.71 |
| $IV_4$ | Liupan mountain region | 0.73 | 0.62 | 118.59 | 0.36 | 19.82 | 0.10 | 59.80 |
| $IV_5$ | Qinba mountain region | 1.01 | 0.82 | 113.98 | 0.32 | 21.55 | 0.11 | 49.44 |
| $IV_6$ | Wuling mountain region | 0.39 | 0.44 | 155.36 | 0.31 | 24.07 | 0.10 | 112.28 |
| $IV_7$ | Yunnan, Guangxi, and Guizhou rocky desertification region | 1.91 | 1.59 | 116.22 | 0.74 | 20.30 | 0.05 | 12.34 |
| $IV_8$ | Wumeng mountain region | 0.34 | 0.57 | 234.1 1 | 0.34 | 20.47 | 0.11 | 148.84 |
| $IV_9$ | Western Yunnan border mountain region | 2.51 | 1.53 | 85.10 | 0.66 | 23.72 | 0.06 | 10.76 |
| $IV_{10}$ | Tibetan regions in Qinghai, Sichuan, Yunnan, and Gansu Provinces | 4.45 | 0.23 | 7.06 | 0.12 | 18.59 | 0.15 | 14.91 |
| $IV_{11}$ | Three prefecture-level units in south Xinjiang | 4.50 | 0.50 | 15.51 | 0.21 | 19.76 | 0.13 | 13.31 |
| **V** | **Ethnic minority autonomous area** | **28.92** | **2.61** | **12.60** | **2.79** | **36.60** | **1.16** | **18.26** |
| $V_1$ | Tibet autonomous region | 12.52 | 0.22 | 2.50 | 0.15 | 22.67 | 0.16 | 5.78 |
| $V_2$ | Xinjiang Uygur autonomous region | 11.59 | 0.65 | 7.87 | 0.75 | 39.24 | 0.36 | 14.07 |
| $V_3$ | Guangxi Zhuang autonomous region | 0.81 | 1.31 | 226.39 | 1.26 | 32.85 | 0.24 | 133.45 |
| $V_4$ | Yanbian Korean autonomous region | 0.45 | 0.17 | 52.41 | 0.35 | 70.35 | 0.18 | 185.78 |
| $V_5$ | Haixi Mongolian-Tibetan autonomous region | 3.14 | 0.04 | 1.62 | 0.07 | 70.08 | 0.13 | 18.95 |
| $V_6$ | Xiangxi Tujia and Miao autonomous region | 0.41 | 0.22 | 72.99 | 0.21 | 33.67 | 0.09 | 100.24 |
| **National level** | | **100.00** | **100.00** | **139.68** | **100.00** | **34.61** | **100.00** | **455.25** |

2. Urbanization position and characteristics: Land area of the urban agglomeration area urbanization development region (I) accounts for 25.85 % of the national total. Population in 2012, however, accounted for 62.83 %. Urban population accounted for 78.42 %. Urbanization level as calculated by household registration was 45.43 % in 2012 (national average was 34.21 %), 10.22 % over the national average. Urban construction land use (city proper) accounted for 67.05 %. Total GDP accounted for 80.57 % (Fig. 5.4). Added value for the primary industry accounted for 59.88 %, for the secondary industry 95.29 %, and 86.14 % for the tertiary industry. Societal fixed asset investment accounted for 76.87 %. Actual utilization of foreign investment accounted for 87.24 %. Population density was 339.87 persons per square kilometer, which was 2.43 times that of the national average. Economic density was 14.21 million RMB Yuan per square kilometer, 3.12 times that of the national average (Fig. 5.5). Apparently, this region has the densest population and economy, highest urbanization level, largest economic scale, and occupies the highest position in China's national urbanization development. This is the absolute primary region for urbanization that determines the future of China's urbanization.
3. Basic functions: This region (I) carries the four primary functions at the national strategic level for New Urbanization:

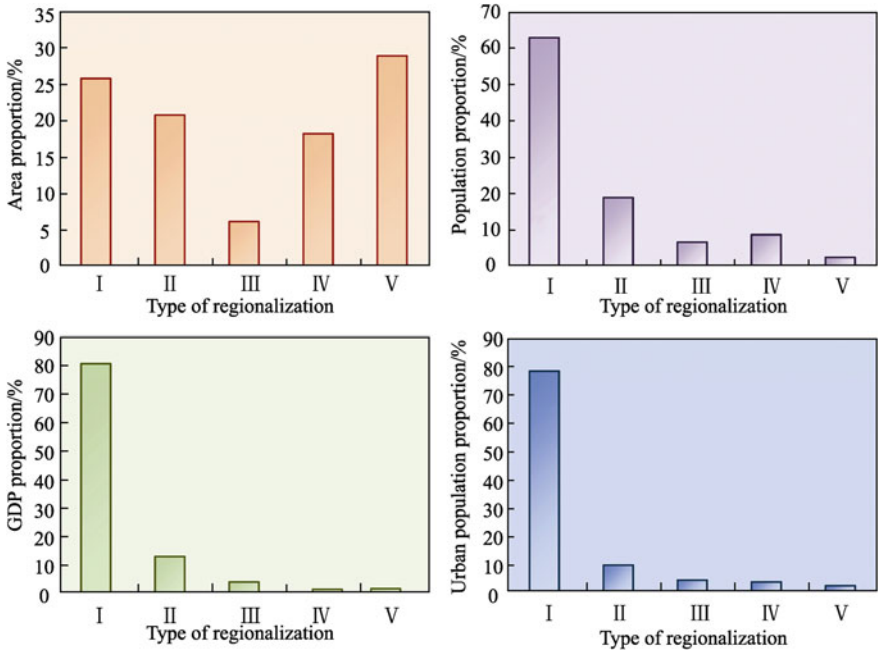


**Fig. 5.4** Comparison of development status of various regions in China

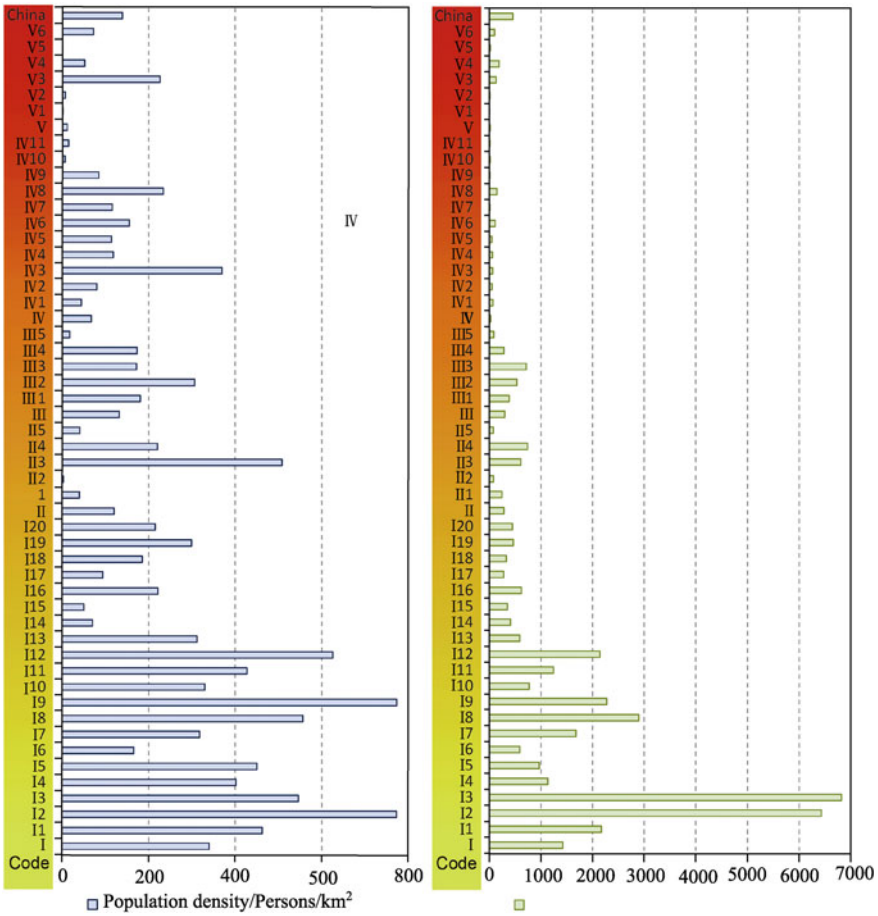


**Fig. 5.5** Population and economy density of China's urbanization development regions and subregions

(a) Function of primary urbanization: This is the primary area for urbanization development in China. Urbanization level will reach 60 % by 2020 to ensure that China's urbanization can steadily and stably enter into the later and mature stages of urbanization.

(b) Function of promoting urbanization quality: Within this region, it is imperative to make sure that urbanization rate and quality must maintain a dynamic balance. The goal is to promote the maximum urbanization quality that is people-oriented.

(c) Function of primary economic development region: By reasonably combining and mobilizing production factors, this region will become one of the world's high-end advanced manufacturing bases and modern service bases. In the meantime, development of this region will make sure China stays as a

competitive second largest economy in the world, and gradually marches to the world's largest economy. Urbanization and development in this region could ensure economic and social security during China's urbanization, and determine its future.

(d) Function of improving quality of live: Development of urbanization in this region will make sure that the quality of life in China will be improved significantly. The living standards will be improved. Public services for both rural and urban residents will be equalized. In doing so, it will ensure that by 2020 China enters a society with moderate prosperity all across the nation.

#### 5.3.1.2 Food Production Area Urbanization Development Region (II): 5 Sub-regions

1. Basic composition: Food production area urbanization development region (II) is the primary region for food production in China, and a critical region for the national food security. It is composed of Northeast food production region $II_1$, Inner Mongolia food production region $II_2$, Yellow River, Huai River and Hai River food production region $II_3$, middle and lower reaches of Yangtze River food production region $II_4$, Southwest food production region $II_5$.
2. Urbanization position and characteristics: Food production area urbanization development region (II) occupies 20.8 % of the nation's total land area. In 2012, its population accounted for 18.97 % of the national total. Urban population accounted for 10.02 %. Urbanization level as calculated based on household registration was 30.43 %, which is 4.2 % lower than the national average (34.61 %, Fig. 5.6). GDP accounted for 13.02 %. Population density was 120.65 persons per square kilometer, lower than the national average (by 19.03 persons per square kilometer). Economy density was 2.85 million RMB Yuan per square kilometer, also lower than the national average (by 1.66 million RMB Yuan per square kilometer). This region is characterized by relatively low population and economy density, relatively high urbanization level, and the second highest economic development level. Among all the urbanization development regions, this region is second only to the primary urbanization development region in terms of strategic position. It is hence also very important for China's New Urbanization development.
3. Basic functions: This urbanization development region involves seven food production areas in the North China, namely, Hebei, Inner Mongolia, Liaoning, Jilin, Heilongjiang, Shandong, and Henan Provinces, and six food production areas in the South China, namely, Jiangsu, Anhui, Jiangxi, Hubei, Hunan, and Sichuan. Based on the 2011 statistics from the National Food Bureau, the cultivated areas within these 13 food production areas accounted for 71.84 % of the national total. The food produced accounted for 75.4 %. The added food products accounted for 95 % of the national total. Apparently, this region is the

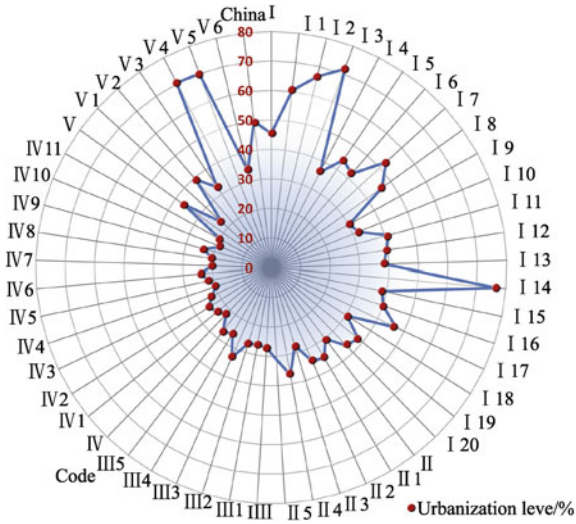


**Fig. 5.6** Urbanization levels at the various urbanization regions and subregions in China

food production region, and food security region in China. To this regard, this region has the following three main functions:

(a) Primary function–national food security. Terrains of the food production area are dominated with flat plains. Their economy is dominated with cultivation. The population is dominated with farmers. In general, these regions are relatively underdeveloped or undeveloped. On the other hand, this region is also the source for China's national food security. It plays critical roles in improving national food production and ensuring national food security. According to the *Medium to Long Term Planning for National Food Security* (*2008–2020*), the food production area urbanization development region shall put ensuring China's food security as the top priority. Implementing New Urbanization strategies in this region must balance between the top priority of ensuring national food security and then promoting urbanization development.

(b) Function of steadily promoting New Urbanization. Since the top priority of this region is the national food security, it is hence imperative to make sure that urbanization development shall in no way compromise the food productivity. Urbanization rate is not the top priority for its development. Instead, efforts shall be put to improve farmers' income and the urbanization quality in this region. The center of the development shall be agricultural development. A sensible approach is to couple strategically agricultural resources and processing industries in this region so that we can enable agricultural industrialization to drive industrialization across the entire rural areas, and eventually promote urbanization in the rural areas. In doing so, we can nurture a unique endogenous urbanization development mode in the food production region.

(c) Functions of promoting integrated urban and rural development and increasing farmers' income. During the promoting of New Urbanization in this region, the primary goals shall be increasing food production and farmers' income, developing rural area, and modernizing agriculture.

#### 5.3.1.3 Agriculture, Forestry, and Pastoral Area Urbanization Development Region (III): 5 Subregions

1. Basic composition: Agriculture, forestry, and pastoral area urbanization development region (III) includes most regions in the mountainous, hilly, or plateau regions. It is also the primary production region for economic crops and comprehensive agricultural development. It includes Southeast Hilly Agriculture, Forestry and Pastoral region $III_1$, South Mountain Agriculture, Forestry and Pastoral region $III_2$, Hainan and South China Sea Archipelago Agriculture, Forestry and Pastoral region $III_3$, Loess Plateau Agriculture, Forestry and Pastoral region $III_4$, and Hexi (West of Yellow River) Corridor Agriculture, Forestry and Pastoral region $III_5$.
2. Urbanization position and characteristics: Agriculture, Forestry and Pastoral area urbanization development region (III) occupies 6.21 % of the nation's total land area. In 2012, its population accounted for 6.77 % of the national total. Urban population accounted for 4.73 %. Urbanization level as calculated based on household registration was 27.16 %, which is 7.55 % lower than the national average (34.61 %). GDP accounted for 4.12 %. Population density was 132.65 persons per square kilometer, lower than the national average (by 7.03 persons per square kilometer). Economy density was 2.99 million RMB Yuan per square kilometer, also lower than the national average (by 1.57 million RMB Yuan per square kilometer). This region is characterized by relatively large population and economy density, relatively low urbanization level, and third-ranked in national economy. Overall, this region is a relatively important region in promoting national New Urbanization strategy.
3. Basic functions:This region is often composed of hilly and mountainous and agriculture and pastoral interchanging areas. As per its terrain characteristics and current development status, the basic functions that this region serves include as follows:

   (a) Function of promoting comprehensive agriculture, forestry, and pastoral development: The key here is to respect the local conditions, promoting various comprehensive development modes with agriculture, forestry, and pastoral sectors, serving to establish a socioeconomically sustainable and moderately prosperous society.
   (b) Function of orderly promoting integration of urban and rural development. This region (III) is the key region for promoting integrated urban and rural development. It is also a key region to explore and promote various

urbanization development modes in agricultural, pastoral, mountainous, and forest regions. The successful experience will provide invaluable lessons for urbanization in such regions across the entire nation and enable a common development and prosperity.

(c) Functions of promoting agricultural modernization and increasing farmers' income. Apparently, in the process of promoting New Urbanization in this region, agricultural modernization, increasing farmers' income, and rural economic development shall be the top goals.

#### 5.3.1.4 Poverty Contiguous Area Urbanization Development Region (IV): 11 Sub-regions

1. Basic composition: Poverty contiguous area urbanization development region (IV) is composed of 11 subregions, namely, south of the Greater Xing'an Mountains region ($IV_1$), Yanshan-Taihang Mountain region ($IV_2$), Dabie Mountain region ($IV_3$), Liupan Mountain region ($IV_4$), Qinba Mountain region ($IV_5$), Wuling Mountain region ($IV_6$), Yunnan, Guangxi and Guizhou rocky desertification region ($IV_7$), Wumeng mountain region ($IV_8$), western Yunnan border mountain region ($IV_9$), the Tibetan regions in Qinghai, Sichuan, Yunnan, and Gansu Provinces ($IV_{10}$), and the three prefecture-level units in South Xinjiang ($IV_{11}$). The designation of this region is based on the 11 nationally recognized main battlefields of poverty alleviation as determined in Article X of the "China Rural Poverty Alleviation and Development Program (2011–2020)" announced and implemented on December 6, 2011 by the State Council.
2. Urbanization position and characteristics:Poverty contiguous area urbanization development region (IV) occupies 18.25 % of the nation's total land area. In 2012, its population accounted for 8.82 % of the national total. Urban population accounted for 4.04 %. Urbanization level as calculated based on household registration was 21.91 %, which is 12.7 % lower than the national average (34.61 %). GDP accounted for 1.13 %. Population density was 67.48 persons per square kilometer, lower than the national average (by 72.2 persons per square kilometer). Economy density was 281,800 RMB Yuan per square kilometer, also lower than the national average (by 4.27 million RMB Yuan per square kilometer). This region is characterized by relatively lower population and economy density, relatively low urbanization level, under- or undeveloped economy and lowest quality of life. Due to its backward development, this region requires urgent attention and intensive national support and supports from other regions as well. For this matter, this region occupies a specifically, and uniquely important strategic position in China's national urbanization development.
3. Basic functions:The poverty contiguous area urbanization development region (IV) contains mostly poverty contiguous areas in the mountainous regions.

Many such regions often cover large areas and are impoverished for fairly long time due to natural conditions that prevents easy access. In addition, other than the mountainous areas, this region also includes the ethnic minority areas in Tibet, Tibetan regions in Qinghai, Sichuan, Yunnan and Gansu Provinces, and the three prefectures in South Xinjiang. The primary functions this region serves include as follows:

(a) Functions of poverty reduction, alleviation and development: This function focuses on the implementation of the "China Rural Poverty Alleviation and Development Program (2011–2020)" to ensure that the poverty contiguous areas will be able to get rid of the entitlement of being national level poverty-stricken counties so that they can realize poverty alleviation, get rich, and become well-off as soon as possible. To achieve such development status, these regions must explore and take advantage of the specific geographic, environmental and resources characteristics, propose location-specific comprehensive development mode involving agriculture, forestry and pastoral activities, and eventually promote these regions' socioeconomic sustainable development and building a moderately prosperous society.

(b) Functions of urbanization that aims at poverty alleviation: The ultimate goal for any projects in poverty contiguous area is to reduce poverty level and enrich the local people. Urbanization is one of such projects. It has profound socioeconomic impacts on poverty contiguous areas. Urbanization on one hand can drive poverty alleviation projects. On the other hand, poverty alleviation projects often promote urbanization in poverty contiguous areas. By combining urbanization and poverty alleviation projects, we propose a New Urbanization mode that aims specifically for poverty alleviation. With such mode, not only will outside investment be injected to promote local economic development, more importantly, via actively urbanizing poverty contiguous areas, we will be able to facilitate these regions to take off and eventually self-develop. The goal is to help these regions to become poverty-free and move to moderately prosperous society by the year 2020.

(c) Functions of protecting the mountain eco-environment and coordinating the human-land relationship in the mountainous areas : In general, the poverty contiguous areas urbanization development region (IV) often has rather poor natural conditions, fragile eco-environment, and frequent natural disasters such as mudslides and landslides. On the other hand, these regions' transportation, communication and other infrastructure and public service facilities are seriously lagging behind. Human-land relationships are extremely tense and not well coordinated. This requires that when promoting New Urbanization strategies in these regions, the fragility of the mountainous regions' ecosystem must be taken into consideration and shall under no circumstances be endangered.

#### 5.3.1.5 Ethnic Autonomous Area Urbanization Development Region (V): Six Sub-regions

1. Basic composition: The ethnic autonomous area urbanization development zone (**IV**) refers to all the ethnic autonomous regions that are not covered by urban development regions I–IV. It is composed of the Tibet autonomous region ($V_1$), Xinjiang Uygur Autonomous Region ($V_2$), Guangxi Zhuang Autonomous Region ($V_3$), the Yanbian Korean Autonomous Region ($V_4$), Haixi Mongolian-Tibetan Autonomous Region ($V_5$), and Xiangxi Tujia and Miao Autonomous Region ($V_6$).
2. Urbanization position and characteristics: Ethnic autonomous area urbanization development region (V) occupies 28.92 % of the nation's total land area. In 2012, its population accounted for 2.61 % of the national total. Urban population accounted for 2.79 %. Urbanization level as calculated based on household registration was 36.6 %, which is 1.9 % higher than the national average (34.61 %). GDP accounted for 1.16 %. Population density was 18.26 persons per square kilometer, lower than the national average (by 127.08 persons per square kilometer). Economy density was 182,600 RMB Yuan per square kilometer, also lower than the national average (by 4.37 million RMB Yuan per square kilometer). This region is characterized by the lowest population and economy density, fairly underdeveloped economy, but relatively high level or urbanization compared to the national average. This region occupies a very specific position in China's New Urbanization strategies. As a matter of fact, its developmental status might cast direct influence upon China's New Urbanization security.
3. Fundamental functions: The ethnic autonomous area urban development region (V) is not a unique, contiguous region. Instead, this region is often located far away from any socioeconomic centers. In the meantime, this region occupies a relatively large amount of land area with sparsely distributed population and various ethnic minority groups. Considering the particular characteristics of this region, we propose that the basic functions of the region can be expressed as follows:

   (a) The first function is to maintain national unity and social stability. The primary focus is to ensure stability and unity in minority autonomous region to achieve harmonious economic development and social and political stability. This function aims at playing an important role in sustainable development and building a moderately prosperous society in these regions.
   (b) Functions of promoting ethnic minority autonomous regions' urbanization: This particular function attempts to explore New Urbanization development models that suit to the characteristics of ethnic minorities. Urbanizing the ethnic minority regions must be embedded into the grand pattern of national

New Urbanization strategy taking into consideration of the unique characteristics of the region. While conditions permit, we can gradually promote some of the ethnic minority autonomous prefecture to prefecture-level cities, and autonomous counties to county-level cities.

(c) Functions of preserving ethnic minority cultural heritage: This particular region often has rich folk cultural resources and strong cultural heritage. In the process of promoting New Urbanization strategies in this particular region, we must coordinate the relationships between inheriting and developing ethnic cultural resources, so that the region could eventually become a unique region for New Urbanization.

## *5.3.2 The Promotion Measures for Comprehensive Regionalization for New Urbanization*

### 5.3.2.1 Start Compiling the National New Urbanization Comprehensive Regionalization Based on Relevant Regionalization Programs

From the establishment of the People's Republic of China until now, along with the transformation and upgrading at different stages of economic development and urbanization, China has compiled and implemented more than 40 different comprehensive or thematic regionalization plans, including China physical geographic regionalization, China's ecological regionalization, China's comprehensive agricultural regionalization, China's economic regionalization, and China's main functional area regionalization. These regionalization plans played significant roles in promoting national eco-environmental protection, socioeconomic development, and space management at certain historical stages. Yet up until very recently, there was not a "people-oriented" comprehensive regionalization plan for New Urbanization. Even the *National New Urbanization Planning* (*2014–2020*) did not provide solid classification of different urbanization regions and relevant development plans based on that. For a country like China that has vast regional differences, we suggest that relevant governmental departments shall start from the strategical goals of implementing the *National New Urbanization Planning*, to compile a National Level New Urbanization Comprehensive Regionalization Plan based on China's comprehensive physical geography regionalization, comprehensive ecological regionalization, comprehensive agricultural regionalization, comprehensive economic regionalization, and primary functional area regionalization. We envision that this New Urbanization regionalization will be able to provide various goals, foci, development directions, and paths for implementing New Urbanization strategies in different regions based on regional characteristics and conditions.

#### 5.3.2.2 Appropriately Adjust the New Urbanization Comprehensive Pilot Program Based on the New Urbanization Comprehensive Regionalization Plan

The current New Urbanization comprehensive pilot program is more a result of administrative directives than anything else. Each provincial administrative unit gets an allocated amount of sites to implement New Urbanization strategies regardless of whether or not they actually meet the criteria. We suggest that with the compiled New Urbanization Comprehensive Regionalization Plan, it is necessary to adjust the current pilot programs. Specifically, we can adjust the 62 New Urbanization comprehensive experimental cities (counties or townships) so that each New Urbanization region and subregion shall have at least one New Urbanization comprehensive pilot city (county or township). Within different New Urbanization region or subregion, we shall conduct comprehensive pilot experiments to test out how to share the cost of urbanizing agricultural population, how to establish diversified and sustainable urbanization finance mechanism, how to set up innovative administrative mode to reduce administrative costs, and how to reform and improve the rural homestead systems. With these comprehensive pilot experiments, we can then propose generalized guidance based on different results.

#### 5.3.2.3 Proposed Differentiated Development Policies and Guidance Based on Different Primary Functions of Different Urbanization Regions

The urbanization development regions of the five different areas, namely, urban agglomeration area, food production area, agriculture, forestry, and pastoral mixed area, poverty contiguous area, and ethnic minority autonomous area, have rather different strategical positions in implementing China's New Urbanization strategies. They also carry varied primary functions of urbanization, and have different New Urbanization development goals, foci, modes, and paths. Because of such differences, we suggest designing different urbanization development policies and guidance based on different regional conditions and characteristics, so that the New Urbanization strategies improve and facilitate instead of impeding local development.

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# Chapter 6
# Quality of China's New Urbanization and Ways for Improvement

The quality of urbanization is an important measure of certain cities in regard to whether or not the urbanization rate is reasonable, population urbanization is healthy, economic urbanization is efficient, social urbanization is harmonious and just, and spatial urbanization is appropriate. China currently is experiencing multiple superimposed processes involving urbanization, industrialization, modernization, and globalization. Urbanization level increases at a rate of 1.4 % annually [1]. Many government working report and scholarly opinions treat the level of urbanization as an important outcome for enhancing regional development [2]. This view regards urbanization level at a strategic height, and proposes strategies to accelerate urbanization to promote rapid economic development. From a superficial perspective, such views seem to be proudly announcing that China's urbanization level has been gradually approaching the average middle-income countries. Under the surface, however, such views conceal a series of sub-health problems behind the numbers [3]. As a matter of fact, speeding up the process of urbanization has become the main goal pursued by all levels of government in China. Yet in pursuit of the "level" of urbanization, the quality of urbanization which is quite important for healthy and sustainable urbanization was largely ignored or avoided. As a consequence, there was a series of key unsustainable issues related to the development of economic efficiency, economic development cost, social security, integrated urban and rural development, the trends for urban and rural surplus labors, rational development and utilization of natural resources, and ecological environment protection and other aspects. To this end, the CPC's "Eighteenth Congress Report" and Central Government's Urbanization working Conference proposed collectively that continuously improving the quality of urban development, promoting people-oriented urbanization, and improving the quality of urbanization are at the core of the healthy and sustainable development of urbanization. Too fast or too slow urbanization is not conducive to the healthy development of urbanization. Urbanization rate and urbanization quality are often the "contradictory" pair in the process of urbanization. How to ensure the rapid growth of China's urbanization is



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accompanied by improved quality of urban development is a major scientific proposition that attracts increasing attention. The ultimate goals is to find a balanced urbanization rate in which urbanization proceeds at a reasonable pace, yet in the meantime, such rate will not unsustainably endanger local resources and environmental carrying capacity, and enables coordinated development of urbanization and economic activities [3].

## 6.1 Relationships Between Urbanization Quality, Speed, and Level

Improving the quality of urbanization is the key to accelerate healthy and sustainable urbanization process in China. Using a so-called quadrant diagram method, we analyzed the evolution of urbanization quality and studied the dynamic interaction between urbanization quality and urbanization level. We also explore the in-depth interaction among urbanization quality, rate, and level in a hope to provide theoretical foundation for improving urbanization quality.

### *6.1.1 Evolution for Urbanization Quality*

The evolution for urbanization quality is a continuously improving process of population, social and economic development quality, and urban land use security. Theoretically, the socioeconomic subsystem within a city has almost endless growing potential. The land use security system, however, is strongly limited by available land, which means the development of population and socioeconomic subsystems will be limited by the availability of land that can be used for urbanization. Under such circumstance, it is easy to see that urbanization quality development will tend to be more like a stretched "S" curve than a (potentially) linear trend. Of course, such "stretched S" curve is but a theoretical model for the development of urbanization quality if the system was regarded as a closed system, and the only working factors are socioeconomic, population, and land use subsystems. From a micro perspective, urbanization is de facto a combined result of coupled growth of multiple factors within the urban system. An obvious trait for urbanization is that the process is neither balanced nor evenly distributed, which is due to the complexity of both human and the city's characteristics. Such imbalance and unevenness can be self-adjusted by the mutual-dependence of various subsystems within the urban system, hence maintaining a dynamic balance without causing drastic changes of the entire urban system. On the other hand, we must realize that the dynamic changes within an urban system caused by the imbalance of growth shall be constrained with certain limits, otherwise, the change could cause catastrophic consequences, leading to the collapse of the entire urbanization process [4].

Specifically, based on the classical Logistic theory of urbanization, and the potential mechanisms influencing regional urbanization quality, as well as the developing principles of the various subsystems of urbanization quality, we propose that the actual development trend for urbanization quality is actually a composite "S" curve that is composed of multiple "sub-S" curves (Fig. 6.1). In particular, there are four sub-S curves that can be tagged as the initial stage (O–A in Fig. 6.1), optimizing stage (A–B), post-perfecting stage (B–C), and sustainable stage (C–D), which correspond to the initial, middle, post, and terminal stages of urbanization.

O–A Stage: Urbanization quality in this stage is rather low. Urbanization rate and the improvement of urbanization quality are fairly slow as well. It can be characterized as low speed and low quality.
A–B Stage: The speed of urbanization increases fast. The socioeconomic subsystem is the primary drive for such rapid urbanization. More importantly, the development is also supported by ample available land for urbanization. In this stage, the expansion of cities in space is the primary phenomenon for urbanization. Though the speed of urbanization is fast, the quality of urbanization, however, remains relatively low since the focus of this stage is expansion in space, which also causes rapid consumption of available lands. This stage is hence characterized as high speed, but medium–low quality urbanization.
B–C Stage: The quality of urbanization has now attracted attention, and more focus has shifted to promote better quality urbanization. In the meantime, since available land for urban expansion has declined drastically, the speed of urbanization dropped quite a lot. This is the stage in which improving urbanization quality becomes the priority of urbanization. It can be characterized by medium speed, medium to high quality of urbanization.
C–D Stage: In this stage, all the subsystems of the urban system (socioeconomic, demographic, and land use) maintained a dynamic balance. High quality is the

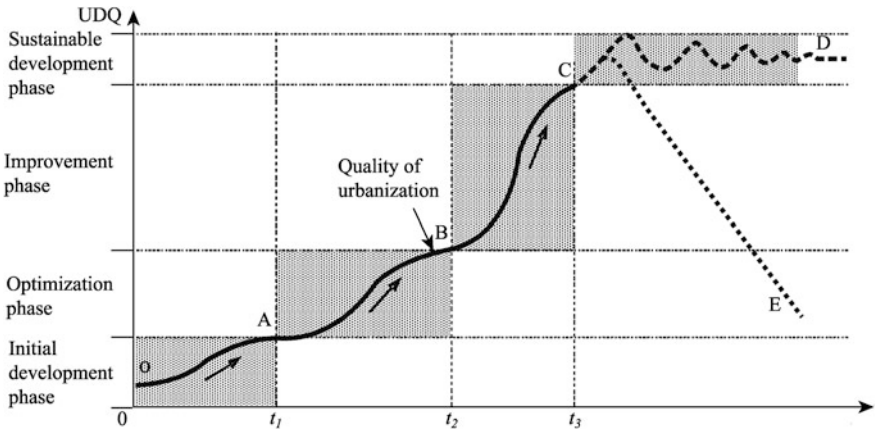


**Fig. 6.1** The evolution of urbanization quality

primary goal for urbanization. Since available land in this stage is extremely limited, urban expansion in space is very limited (if at all), hence is a high quality, low speed urbanization stage. In addition, this is also a stage that maintains a high level dynamic balance among socioeconomic, demographic, land use subsystems. Such dynamic balance, though strong from within, can be broken if the development focuses too much on socioeconomic development with little or no consideration of the land use security level. Advanced science and technology level will certainly help improve the security of the dynamic balance, yet if the development of other subsystems pushes the land use security system too much, the entire system could collapse, which will lead to quick drop of urbanization quality and even termination of the entire urban system (C–E).

The above discussed single and complex urbanization development quality evolution "S" curves can be regarded as a dialectical unity. From shorter-time scales perspective, the different stages of urbanization quality evolution are different new "S" curves that are derived from the large "S" curve at the longer time scale. It is also the formation of a logistic growth trend of "slow → acceleration → slowdown." From a longer time-scale perspective, the evolution of urbanization quality is a typical "S," though it is a composite "S" curve that contains shorter-time-scale "S" curves instead of a simple one. The composite curve follows a process as: rapid economic and social development → urban expansion → higher efficiency (technical progress) → improvement of urbanization quality → increasing consumption of natural resources decreasing urbanization spatial security (decreasing land availability for urban expansion) → decreasing socioeconomic development quality → technological advancement → reduced consumption of resource and environmental capacity → improved urbanization spatial security → rapid socioeconomic development. Due to the fact that socioeconomic components have very different dynamics at different stages of urban development, the level of land use requirement and security will be very different as well. It is hence vital to analyze the mechanisms of regional urbanization quality dynamics based on different stages.

#### 6.1.1.1 The Dynamic Mechanisms During the Initial Stage of Urbanization Quality Development

This stage corresponds to the initial stage of industrialization and economic growth. Urbanization is at a slow pace. Urbanization is low, too. It generally does not exceed 1–30 %. The primary industry accounts for more than 70 % of local GDP, and employs more than 50 % of the local labors. The secondary industries typically account for lower than the 30 %. Industrialization is the main driving force for urbanization. The number and spatial scale of cities are usually small. The spatial structure shows a sporadic "dot-dominated" structure. During this period, industrialization is the basic driving force for urbanization. Urban development is mainly through the expansion and increased employment in industrial enterprises and capital

attracted by the expanded reproduction. Specifically, urbanization in this stage is often seen as simple expansion in spatial scales and increasing in numbers. However, due to inadequate transportation infrastructure and low level concentrations of demographic and socioeconomic factors in urban areas, the quality of economic development is relatively low. In the meantime, due to the limited size of the economy, investment in infrastructure in the social sphere is also limited, hence low quality of social urbanization. Overall, in this stage, urbanization and urbanization quality development speeds are slow, and the overall urbanization quality is low.

#### 6.1.1.2 Dynamic Mechanisms During the Optimizing Stage of Urbanization Quality

This stage corresponds to the mid-stage of industrialization and economic growth, and is characterized by rapid urbanization. During this stage, the level of urbanization increases quickly, and can reach anywhere in between 30 and 60 %. The rate of urbanization is also accelerating with an average annual growth rate of more than 1–2 %. Urban population and industrial economy gradually dominated the socioeconomic structure. The contribution of primary industry dropped to less than 30 % to the GDP. Employment in the secondary and tertiary industries increases gradually, and industrialization rate gradually increased to 30–70 %. Industrialization is the main driving force for urbanization. The development of the tertiary industry also starts to emerge as another important (though not primary) driving force for urbanization. The number of cities increases rapidly, and urban spatial scales increase continuously. The urban spatial structure starts to be dominated by continuous "ribbon" or "areal" instead of "dot." Despite the evolution of industrial structure, the dominating industries are still resource and energy consumption intensive ones, which means the cost for economic development is still large. The economic and social urbanization quality improves slightly, but land use security for urbanization tends to be smaller and smaller. Existing resources and environmental conditions are insufficient to support further economic and social development, causing lack of coordination among urban infrastructure, natural environment and urban development, and producing a series of urban issues. During this stage, urbanization is at a relatively high speed, but improvement of urbanization quality is limited, and stays at medium to low level.

#### 6.1.1.3 Dynamic Mechanisms for Post-Perfecting Stage of Urbanization Quality

This stage corresponds to the mature and late stages of industrialization and economic growth, hence also a decelerating urbanization stage. The urbanization level, however, continues to increase, and can reach in between 60 and 80 %, with an average annual growth rate of 0.5–1 %. Urban population and industries gradually dominate overwhelmingly the demographic profile and economic structure of the

region. In particular, the primary industry (agriculture) dropped to less than 20 %, the proportion of tertiary industry output value increased to more than 35–45 %. In addition, industrializing rate began to decline to 30–40 % in this third stage of urbanization. Development of the tertiary industries has become the main driving force for urbanization, while the contribution of the secondary (manufacturing) industries gradually decreases. The number of cities continues to increase, and urban scales continue to expand. Urban spatial structure starts to show a continuous "network" structure. Due to a revolutionary change in the industrial structure, the tertiary industries consist of generally capital and technology-intensive industries, which have relatively less damage to the resource and environment bases. At the same time, human beings start to be aware of the serious impacts on the resource and environmental carrying capacity due to rapid urbanization in the past. In this particular stage of urbanization, improving urbanization quality is the primary focus. In this stage, urbanization level and quality both improve rather rapidly, and the urbanization quality is in the medium to high level.

#### 6.1.1.4 Dynamic Mechanisms for Sustainable Stage of Urbanization Quality

This stage of urbanization corresponds to the postindustrialization and the climax stage of economic growth. Since urbanization level reaches the limit (80–100 %), urbanization rate is very slow. Urban population growth is increasingly slow or even stagnant since most people are now living in the cities. The difference between urban and rural areas is now indistinguishable, suburbanization and even the so-called "inverse-urbanization" dominates the urbanization dynamics. The primary industry dropped to less than 10 %, but not less than 5 % in the local GDP. The proportion of the tertiary industry output value increased to more than 60 %, while the secondary industries dropped to below 30 %. The tertiary industry now becomes the main driving force of urbanization. Urban spatial structure now exhibits a balanced network structure. In reality, since available land for urbanization is closed to be all converted to urban land, the regional economy, and social development will not immediately enter the desired steady and sustainable state. Instead, it often requires a certain period of time to gradually stabilize. But this change of demographic and socioeconomic scale is within the elastic limits of the local ecosystem's capacity, and the over-limit of such activities can be modified, restrained and repaired with advanced technologies. In this case, after a certain period of feedback, mutual interactions, constraints, and adjustment between the land use and socioeconomic subsystems, urbanization will eventually stabilize and maintained at the sustainably high level. Urbanization quality will increase slowly but steadily until it remains at a relatively high, but stable stage (C–D stage). Apparently, the development of economy and society will not continue infinitely. This is not only because the development and utilization of resources and environment are often irreversible, even with advanced technologies which might relieve the pressure on resources and the environment, but also because they are essentially irreplaceable.

Once the pressure brought by development of population, economy, and society exceeds the dynamic local resources and environmental carrying capacity, and is beyond repairing by human science and technology, the consequence is that it will eventually lead to irreversible changes which could eventually destroy urbanization, leading to irreversible deterioration of the urban land system, and eventual collapse of urban socioeconomic system (C–E stage).

### 6.1.2 Dynamic Conversion Between Urbanization Quality and Level

The relationships among urbanization quality, efficiency, level, and scale reflect the actual progress of urbanization. In different stages of urbanization, the underlying development mechanisms for urbanization quality and level are different. A simple examination of the different combination of urbanization quality and level can facilitate the identification of the state of the country or region's urbanization status. Changes in the level of urbanization can be divided into three types, namely, progressive, unchanged, and narrowed. Changes in the quality of urbanization can be divided into three types as well, i.e., increased, unchanged, and decreased. By combining the three types of both urbanization quality and level, we can have nine dynamic modes of urbanization, namely, the growth × progressive type, growth type, growth × negative progressive type, progressive type, stagnant type, negative progress type, negative growth × progressive type, negative growth, and negative growth × negative progressive type (Table 6.1).

### 6.1.3 Interaction Between Urbanization Quality and Rate

When the level of urbanization is higher or lower than the development of urbanization quality, we say the two are decoupling. We can formulate the degree of such decoupling via calculating the coordination or synchronization between urbanization level and quality. The calculation can be expressed as:

**Table 6.1** Relationships between urbanization quality and level

| Item | Changes of urbanization quality | | | |
|---|---|---|---|---|
| Changes of urbanization level | Type | Increase | Constant | Decrease |
| | Expand | Growth × progress | Growth | Growth × negative progress |
| | Constant | Progress | Stagnation | Negative progress |
| | Shrink | Negative growth × progress | Negative growth | Negative growth × negative progress |

$$E_{(t)} = \begin{cases} \frac{Z_{(t)} - V_{(t)}}{|Z_{(t)} - V_{(t)}|}\left[1 - \frac{\min\{Z_{(t)}, V_{(t)}\}}{\max\{Z_{(t)}, V_{(t)}\}}\right] & \cdots \quad Z_{(t)} \neq V_{(t)} \\ 0 & \cdots \quad Z_{(t)} = V_{(t)} \end{cases}$$

where $E_{(t)}$ represents the degree of coordination between urbanization level and quality. If it is more than zero, indicating urbanization quality is ahead of urbanization level; if it is less than zero, then the opposite is true. We say that urbanization quality and level are perfectly coordinated if $E_{(t)}$ is zero. $Z_{(t)}$ represents the urbanization quality in the $t$th year or the $t$th region, while $V_{(t)}$ is the urbanization level in the $t$th year or the $t$th region, which is basically calculated as the adjusted percentage of population who live in the cities (100 % is the highest value). From the standpoint of coordinated urbanization quality and level, we can further categorize urbanization into exceedingly lagging level, lagging level, coordinated, exceedingly lagging quality, and lagging quality.

### 6.1.4 *Quadrant Graphs Describing Urbanization Quality, Rate, and Level*

We can construct a so-called quadrant diagram with the urbanization quality as the $x$-axis, the urbanization development rate as the $y$-axis. Within such quadrant diagram, we will be able to depict the interactive relationships among urbanization quality, rate, and level. The diagram is called a regional urbanization development characteristics quadrant diagram. According to Zhou Yixing's [5] analysis on the development of urbanization rate, we deem urbanization rate (change of urbanization levels) of 0.6–0.8 % annually normal rate. If the rate is more than 0.8 % per year, we say this is high speed urbanization. It is possible for individual cities to experience as high as 1 % urbanization rate, yet if such high speed lasts for several years in a roll, then the urbanization is likely to be risky. If, however, the rate for urbanization for several years reaches 1.44 %, then we call such urbanization "pseudo"-urbanization. Based on this theory, we then divide the rate for urbanization to four types, namely, low rate ($v < 0.3$), the low to medium rate ($0.3 \leq v < 0.6$), medium to high rate ($0.6 \leq v < 0.8$), and high rate ($0.8 \leq v$). Combining with the four types of urbanization quality [low quality (where the urbanization development quality (UDQ) is less than 0.3), low to medium quality ($0.3 \leq \text{UDQ} < 0.6$), medium quality ($0.6 \leq \text{UDQ} < 0.8$), high quality ($0.8 \leq \text{UDQ}$)], we will be able to create 16 different types of various coordination among urbanization quality, rate, and level for different development stages (Fig. 6.2) From the above two figures, we can see that theoretically, the level of urbanization in the quadrant diagram has an inverted "U" shaped. The 30, 60, 80 % of urbanization level correspond to three important turning points for the quality and speed of urbanization. From empirical studies, we can see that in developed areas,

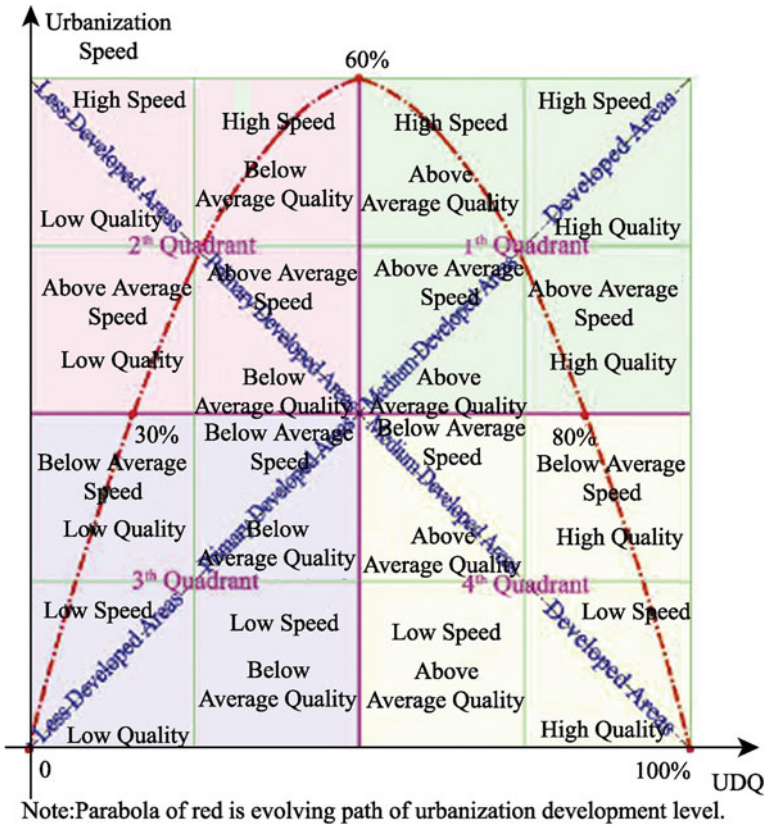


**Fig. 6.2** Relationships among urbanization quality, rate and level in different development stages

urbanization in general is of high quality, high speed, high level or high quality, low speed, high level. In less developed regions, urbanization in general is of low quality, low speed, low level or low quality, high speed, low level. In developing and middle developed areas, urbanization in general is of medium quality, medium speed, and medium level.

In the above urbanization quality, rate, and level quadrant diagram, we can see that the first quadrant is of high quality, high speed, medium to high level of urbanization, the second quadrant is of low quality, high speed, and medium to low level of urbanization. The third quadrant is of low speed, low quality, and low level of urbanization. The fourth quadrant is of high quality, low speed, and high level of urbanization. Within each quadrant, according to the relationship between urbanization development quality and rate, it can be further subdivided into four smaller quadrants, each divided into upper, middle, and lower urbanization quality and the upper, middle, and lower urbanization growth rate. With all these quadrants and

sub-quadrants delineated, we will be able to place any individual cities into the diagram and determine its urbanization level, quality, and rate, and how they are interacting, so that we know their development status and provide appropriate policy guidance and interference if needed. We will discuss the four quadrants in more detail following the route of urbanization, namely, the third, the second, the first, and the fourth quadrant.

#### 6.1.4.1 The First Quadrant: High Quality, High Rate, and Medium to High Level of Urbanization

The first quadrant is characterized with high quality, high rate, and medium to high level of urbanization. In this period, when the urbanization level is between 60 and 80 %, the aggressive growth of urbanization makes the local government departments aware of the weak industrial base, the irrational economic structure, the uncoordinated urban and rural development, the weak capability of transferring rural surplus labor force, the serious environmental pollution problems, and low degree of systematic urbanization. In the meantime, they have also realized that urbanization quality shall be at least as important as urbanization rate. As a matter of fact, during this period, more concerns shall be given to urbanization quality. The rates of improving urbanization quality and urbanization level are both at high level, but the rate for urbanization quality is faster than that of urbanization level. Within this quadrant, there are four sub-quadrants that represent four different types of urbanization in terms of urbanization rate, quality, and level, namely, medium to high rate, medium to high quality, and medium to high level; medium to high rate, high quality, and medium to high level; high rate, medium to high quality, and medium to high level; and high rate, high quality, and medium to high level.

#### 6.1.4.2 The Second Quadrant: Low Quality, High Rate, Low to Medium Level Urbanization

The second quadrant is characterized with low quality, high rate, and low to medium level of urbanization. This quadrant describes the stage of urbanization in which the level is gradually increasing, the rate is fast, but with the improvement of both the level and rate of urbanization, the needs for various resources increase as well. This indicates that the cost for economic development is gradually increasing, with low level of social security, and damage to local resources and the environment basis. In this stage of urbanization, the rate is faster, but the quality is not high. The four sub-quadrants within this quadrant are characterized as: medium to high rate, low quality and low to medium level urbanization; medium to high rate, low to medium quality, and low to medium level urbanization; high rate, low quality, low to medium level urbanization; and high rate, low to medium quality, low to medium level urbanization.

#### 6.1.4.3 The Third Quadrant: The Low Quality, Low Rate, Low Level Urbanization

The third quadrant is characterized by low quality, low rate, and low level (low all around) urbanization. This quadrant describes the initial stages of urbanization. In this stage, the economy is dominated by agriculture production. The level, rate, and quality of urbanization are all low. Since agriculture production has relatively low demand for resources, energy and eco-environment, indicating a low quality of socioeconomic urbanization quality, but the security level for spatial urbanization quality (available land for urbanization) is fairly high. Within this quadrant, the four sub-quadrants that characterize the four different types of urbanization are: low rate, low quality, and low level; low rate, low to medium quality and low level; low to medium rate, low quality and low level; and low to medium rate, low to medium quality, and low level.

#### 6.1.4.4 The Fourth Quadrant: High Quality, Low Rate, and High Level Urbanization

The fourth quadrant includes cities when their urbanization level is over 80 %. The rate for urbanization starts to slow down or even stagnate (since the level is already close to its upper limit). In this stage, urbanization focuses mainly on urbanization quality. Spatial urbanization security is very low (very little land available for further urbanization), but social and economic urbanization are all at high level. The four sub-quadrants within this quadrant are characterized as: low rate, medium to high quality, high level; low rate, high quality, and high level; medium to low rate, medium to high quality, and high level; and low to medium rate, high quality and high level.

## 6.2 Measuring Urbanization Quality

The urbanization quality (sometimes referred to as urbanization development quality or UDQ) is an integrated combination of economic, social, and spatial urbanization quality. Enhanced urbanization quality is the key to promoting sustainable and healthy urbanization. How to determine urbanization quality in a region or of a city is high or low? How to evaluate the rate of urbanization? To answer these questions, we must first create a quantitative measure for urbanization quality. By exploring the connotation of urbanization quality, influential factors, regulatory mechanism, and the mutual interaction among urbanization quality, rate, and level, we put forward three types of indicators, consisting of 12 specific indices of economic, social, and spatial (land use) aspects to measure the urbanization quality. We also introduce the so-called Atkinson model to construct an urbanization quality sub-element and segment measuring model. We used the model to evaluate China's urbanization quality at the provincial level and described such the spatial distribution of China's urbanization quality.

### 6.2.1 The Three Dimension Indicator System Measuring Urbanization Quality

#### 6.2.1.1 Construction of the Three-Dimensional Indicator System

According to the connotation of urbanization development quality (UDQ), considering the past experience of building urbanization quality indicator system, with the principles of comparability, scalability, availability of data and feasibility, we build a so-called three-dimensional indicator system. The indicator system takes the rate of urbanization as a regulation standard, includes the three dimensions consisting of the economic urbanization development quality (EUDQ), social urbanization development quality (SUDQ) and spatial urbanization security quality (SUSQ) and a total of 12 comprehensive measuring indices. As it can be seen from Fig. 6.4, the EUDQ includes economic efficiency index (EEI), the economic structure index (ESTI), the cost of economic development index (ECI), and the economic growth force index (EFI). The SUDQ includes the Human Development Index (HDI), the Social Security Index (SSI), Infrastructure Development Index (IDI), and the urban and rural development index (URII). The SUSQ includes water resource security index (WRSI), construction land protection index (LCSI), energy security index (ESI), and the ecological environment security index (EESI). The above indicators will be calculated via a series of raw information and data that are readily available from various sources (Fig. 6.3).

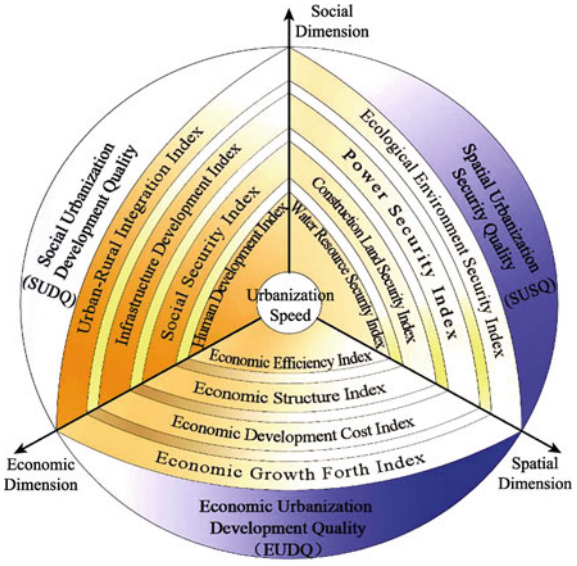


**Fig. 6.3** 3D index ball for comprehensive measurement of UDQ

#### 6.2.1.2 Calculating the Various Indicators

1. EEI is often calculated via two approaches in empirical studies: the stochastic frontier analysis (SFA) and data envelopment analysis (DEA) [6]. DEA analysis method uses labor and fixed capital stock as independent variables, and the comparable GDP as the dependent variable. Specifically, if the $j$th region's $i$th resources investment is represented as $x_{jl}$, $y_{jm}$ is the $m$th output in the $j$th region, using the CRS model, we shall be able to obtain the corresponding regional economic efficiency over the years. EEI is calculated as follows:

$$\begin{cases} \text{EEI} = \theta \\ \min[\theta - \varepsilon(e_1^{\mathrm{T}} s^- + e_2^{\mathrm{T}} s^+)] \\ \text{s.t.} \sum_{j=1}^{k} x_{jl}\lambda_j + s^- = \theta x_l^n \quad l = 1, 2, \ldots, L \\ \sum_{j=1}^{k} y_{jm}\lambda_j - s^+ = y_m^n \quad m = 1, 2, \ldots, M \\ \lambda \geq 0 \quad n = 1, 2, \ldots, K \end{cases}$$

   where $\theta(0 < \theta < 1)$ is the comprehensive technical scale efficiency index, or simply the overall efficiency index. $\lambda_j(\lambda_j \geq 0)$ is the weight, $s^-(s^- \geq 0)$ is the slack variable, $s^+(s^+ \geq 0)$ is the remaining variable, $\xi$ is a non-Archimedean infinitesimal, $e_1^{\mathrm{T}} = (1, 1, \ldots, 1) \in E_m$ and $e_2^{\mathrm{T}} = (1, 1, \ldots, 1) \in E_k$ are $m$-dimensional $k$-dimensional unit vectors. Closer the value of $\theta$ is to 1, the higher the economic efficiency of the $n$th region, and vice versus. When $\theta = 1$, it indicates that the region is running at optimal economic frontier surface, the output in the region reaches optimal overall efficiency in terms of the investment.
2. Economic structure index (ESTI). Economic structure includes two aspects, namely, the upgrading of the overall industrial structure, and the evaluation of such upgrading. It can be expressed as:

$$\text{ESTI} = \frac{1}{m}\sum_{i=1}^{2} (\text{ESTI})_i = \frac{2}{3}\left(\frac{t_i}{s_1}\right) + \frac{1}{3}\left(\frac{p_i}{s_2}\right)$$

   where $t_i$ is the percentage of the tertiary industries in local GDP, $p_i$ is the percentage of the high-tech industries in local GDP, and $s_1$ and $s_2$ are the ideal values of the tertiary and high-tech industries in local GDP, $m$ is a constant.
3. Economic cost index (ECI). ECI is composed of three costs, i.e., energy costs, water resources costs and environmental costs. It can be expressed as:

$$\begin{aligned}\mathrm{ECI} &= \frac{1}{3}\sum_{i=1}^{3}(\mathrm{ECI})_i \\ &= \frac{1}{3}\left\{\left(\frac{r_i}{s_1}\right)+\left(\frac{w_i}{s_2}\right)+\frac{1}{4}\left[\left(\frac{ww_i}{s_3}\right)+\left(\frac{wg_i}{s_4}\right)+\left(\frac{ws_i}{s_5}\right)+\left(\frac{wc_i}{s_6}\right)\right]\right\}\end{aligned}$$

where $r_i$ is energy consumption per 10,000 RMB Yuan GDP, $w_i$ is water resources consumption per 10,000 RMB Yuan GDP, $\frac{1}{4}\left[\left(\frac{ww_i}{s_3}\right)+\left(\frac{wg_i}{s_4}\right)+\left[\frac{ws_i}{s_5}\right]+\left(\frac{wc_i}{s_6}\right)\right]$ is environment cost per 10,000 RMB Yuan GDP. $ww_i$ is the discharge of waste water per 10,000 RMB Yuan industrial output. $wg_i$ is the discharge of waste gas per 10,000 RMB Yuan industrial output. $ws_i$ is the solid waste per 100 million RMB Yuan industrial output. $wc_i$ is the discharge of carbon dioxide per 10,000 RMB Yuan GDP. $s_1$, $s_2$, $s_3$, $s_4$, $s_5$, and $s_6$ are the ideal values for the above parameters. Since ECI indicates a consumption of the environmental service, in real application, the value 1 − ECI is used for measuring urbanization quality.

4. Economic growth force index (EGFI) is calculated via a modified Solow residual approach to estimate the contribution of science and technology to economic growth. It can be expressed as:

$$\mathrm{EFI} = \frac{Y-\alpha K-\beta L}{YS_i}\times 100\,\%$$

where $Y$ is the average rate for output, we are using GDP as a proxy. $K$ is the annual growth rate for capital, $\alpha$ is the elasticity of capital (meaning the percentage increase of output per 1 % of capital increase controlling for all other factors), $\beta$ is the elasticity of labor (meaning the percentage increase of output per 1 % of labor increase controlling for all other factors). $\alpha + \beta = 1$ (based on empirical analysis, we usually set $\alpha = 0.6$ and $\beta = 0.4$), $\alpha K$ and $\beta L$ are the contributions of capital and labor to economic growth, respectively, and $s_i$ is the standard value for the contribution of science and technology.

5. Human Development Index (HDI). The HDI is adopted from UNDP's calculation which is based on life expectancy, knowledge, and quality of life [7]. It is calculated as:

$$\mathrm{HDI} = \frac{1}{3}\left[\frac{\log y-\log y_{\min}}{\log y_{\max}-\log y_{\min}}+\left(\frac{2}{3}\frac{l_{ij}-l_{\min}}{l_{\max}-l_{\min}}+\frac{1}{3}\frac{s_{ij}-s_{\min}}{s_{\max}-s_{\min}}\right)+\frac{a_{ij}-a_{\min}}{a_{\max}-a_{\min}}\right]$$

where $y_{\max}$ and $y_{\min}$ are the minimum and maximum values for $\left(\frac{2}{3}\frac{l_{ij}-l_{\min}}{l_{\max}-l_{\min}}+\frac{1}{3}\frac{s_{ij}-s_{\min}}{s_{\max}-s_{\min}}\right)$ is the contribution of knowledge to human development, $l_{\max}$ and $l_{\min}$ are the maximum and minimum value for adult literacy rate. $s_{\max}$ and $s_{\min}$ are the maximum and minimum value for the average year

receiving formal education. $a_{\max}$ and $a_{\min}$ are the maximum and minimum average life expectancy.

6. Social security index (SSI). SSI is composed of the negative SSI (often represented by unemployment rate), the percentage of social security investment in GDP, and the coverage of social security (fairness). It can be calculated as:

$$\mathrm{SSI} = \frac{1}{3}\sum_{i=1}^{3}(\mathrm{SSI})_i = \frac{1}{3}\left[\left(\frac{s_1}{u_i}\right) + \left(\frac{f_i}{s_2}\right) + \left(\frac{c_i}{s_3}\right)\right]$$

where $u_i$ is the unemployment rate. $f_i$ is the percentage of social security expenditure in GDP. Social security expenditure is composed of social insurance and social benefits (including social assistance or special care spending) expenditure. $c_i$ is the coverage of social security. This refers to the ratio of the number of workers covered by social insurance account of all workers, which consists of pension coverage, unemployment insurance coverage, health insurance, work injury insurance, and maternity insurance coverage. It is an arithmetic average of the five types of coverages, namely, $c_i$ = 1/5 × [(number of workers that are covered by pension + unemployment insurance + medical insurance + injury insurance + maternity insurance)/(the total workforce)] × 100 %. $s_1$, $s_2$, and $s_3$ are the corresponding ideal values.

7. Infrastructure development index (IDI). IDI refers to the level of municipal and social service infrastructure that provide the daily necessities for citizens. It is calculated as:

$$\mathrm{IDI} = \frac{1}{m}\sum_{i=1}^{2}(\mathrm{IDI})_i = \frac{2}{3}\left\{\frac{1}{3}\left[\left(\frac{w_i}{s_1}\right) + \left(\frac{h_i}{s_2}\right) + \left(\frac{r_i}{s_3}\right)\right]\right\} + \frac{1}{3}\left[\frac{1}{2}\left(\frac{d_i}{s_4} + \frac{t_i}{s_5}\right)\right]$$

where $w_i$ is the tap water coverage. $h_i$ is the average urban living space. $r_i$ is the average road areas. $d_i$ is the amount of doctors per 10,000 people. $t_i$ is the number of teachers for mandatory education per 100 people. $s_1$, $s_2$, $s_3$, $s_4$, $s_5$ are the corresponding ideal values.

8. Urban rural integration index (URII). It is calculated as:

$$\mathrm{URII} = \frac{c_i}{u_i s_i}$$

where $c_i$ is the pure income for rural residence, and $u_i$ is the urban residents' disposable income. $s_i$ is the ideal value.

9. Water resources security index (WRSI). The WRSI is calculated as:

$$\mathrm{WRSI} = \frac{WT_i \times r_i \times f_i}{\mathrm{AWPU}_i \times s_i}$$

where $WT_i$ is the regional total amount of water resources. $r_i$ is the percentage of usable water resources.[1] $f_i$ is the percentage of urban water usage over total water usage. $\text{AWPU}_i$ is the regional total demand for water resources. $s_i$ is the ideal value. When calculating WRSI, we are actually using the ratio between the amount of water available to cities and urban water demand as the basis for obtaining WRSI. Given that the regional agricultural water usage accounts for larger percentage of the total water use, we removed the agricultural water usage and use the residual as the basis for urban water resources, and assuming that at the provincial administrative level, individual consumption of water is the same.

10. Land construction security index (LCSI). LCSI is evaluated using regional available land resources and potential for urban land conversion. Regional available land resources are the amount of land that can be converted to urban land. According to the *National Land Use Survey Report* and other related studies, the primary sources for newly converted urban land are agriculture land, and half of them are arable land, which indicates the amount of agriculture land determines the urban land security level [8]. Since the data for total agriculture land resources are often hard to obtain, we use per capita arable land in the area as basis for calculating urban land security. LCSI can be estimated as:

$$\text{LCSI} = \frac{1}{2}\left(\frac{\text{PAA}_i}{\text{HPAA}_i \times s_1} + \frac{\text{PCA}_i}{\text{HPCA}_i \times s_2}\right)$$

where $\text{PAA}_i$ is per capita arable land. $\text{HPAA}_i$ is the minimum demand for arable land per capita.[2] $\text{PCA}_i$ is the average construction land area (which equals to city proper area/urban population). $\text{HPCA}_i$ is the sustainable (healthy) per capita construction land area (based on our empirical evaluation of land

[1]Regional water resources development and utilization rate refers to the ratio of used amount of water resources in the amount of available water resources within a watershed or region. It is an important indicator reflecting the degree of development and utilization of water resources. The international community generally believes that the development and utilization rate of a river should not exceed 40 % of its total amount of available water resources. China has six level 1 water zones in the North (Songhua River, Liaohe River, Haihe River, Yellow River, Huaihe River, and Yangtze River) and four in the South (Pearl River, Southeast Rivers, Southwest Rivers, and Northwest River). Based on China's water resources development and utilization rate, the threshold values for Songhua River, Liaohe River, Haihe River, Yellow River, Huaihe River, Yangtze River, the Pearl River are set as 34, 38, 45, 36, 38, 31, 32, 35, 35, 35 %. Water resources development and utilization rate at different provincial units shall then be determined by the corresponding watersheds.

[2]Based on minimum cropland per capita in 3 large areas of China calculated by Cai Yunlong et al. and according to the standard of food of 400 kg per capita, it is determined that during the period from 1980 to 1990 and the period from 1991 to 2008, the minimum cropland per capita in China are 1.54 and 1.28 mu (15 mu = 1 ha.) respectively; and the minimum cropland per capita in the east, the mid and the west of China are 0.84, 1.20 and 1.67 mu respectively.

uses for residence, infrastructure, road and traffic, industry, storage and green-belt, we determine that it is 102 $m^2$). $s_1$ and $s_2$ are the ideal values.

11. Energy security index (ESI). ESI is calculated as:

$$\mathrm{ESI} = \frac{P_r}{C_r \times s_i}$$

where $P_r$ is the total produced energy, which includes all available energy produced during certain period of time. $C_r$ is the total energy consumption, which includes energy consumption for production, living and other activities. $s_i$ is the ideal value.

12. Eco-environmental security index (EESI). EESI includes air, water, and land environments. It is calculated as:

$$\begin{aligned}\mathrm{EESI} &= \frac{1}{3}\sum_{i=1}^{3}(\mathrm{EESI})_i \\ &= \frac{1}{3}\left\{\frac{1}{2}\left[\left(\frac{a_i}{s_1}\right)+\left(\frac{g_i}{s_2}\right)\right]+\left(\frac{w_i}{s_3}\right)+\frac{1}{2}\left[\left(\frac{r_i}{s_4}\right)+\left(\frac{s_i}{s_5}\right)\right]\right\}\end{aligned}$$

where $\frac{1}{2}\left[\left(\frac{a_i}{s_1}\right)+\left(\frac{g_i}{s_2}\right)\right]$, $\left(\frac{w_i}{s_3}\right)$, $\frac{1}{2}\left[\left(\frac{r_i}{s_4}\right)+\left(\frac{s_i}{s_5}\right)\right]$ represent the security level for atmosphere, water and land environments, respectively. $a_i$ is the air quality index (it is calculated as the average treatment rate for $SO_2$ and soot. Among them, $SO_2$ treatment rate = (the amount of $SO_2$ treated/total amount of $SO_2$) × 100 %. The treatment rate for soot follows similar equation). $g_i$ is the green land coverage in the city proper. $w_i$ is the treatment rate for wastewater (include both domestic sewage and industrial wastewater). $r_i$ is the domestic garbage treatment rate. $s_i$ is the industrial solid waste recycling rate. $s_1$–$s_5$ are corresponding ideal values.

## 6.2.2 Evaluation Standard and Basis for Urbanization Quality

### 6.2.2.1 Judging Standards for Urbanization Quality

From previous studies on judging urbanization quality, there are four different approaches to determine the standard values (ideal values). First is the use of international or national standard values that are often reported in relevant studies. Second is to refer to domestic or leading foreign countries' standards. Third is to actually calculate the ideal values based on available models or other relevant information. Fourth is to use authoritative literature for reference. Based on the stage definitions of domestic and international studies on urban development,

combined with the development of urbanization quality, rate, and level, we divide the development of urbanization quality into four stages, namely, low quality stage ($0 < UDQ \leq 0.3$), the low to medium stage ($0.3 < UDQ \leq 0.6$), medium to high stage ($0.6 < UDQ \leq 0.8$), and the high quality stage ($0.8 < UDQ \leq 1$). Using 30, 60, 80, and 100 % of urbanization level as critical turning (terminal) points, we define the standard values as when urbanization level reaches 100 % (all population lives in the cities). When urbanization level is at the other turning points (30, 60, and 80 %), the standard values shall then take a portion of the standard value when the urbanization level is 100 %. Based on this discussion, we are then able to construct the urbanization quality measurement indicator system (Table 6.2). In addition, we use the AHP model with entropy calculations to produce weights for all the individual indicators and their integrated ones [4].

#### 6.2.2.2 Ideal Values and Other Values for the 12 Indictors–Indices

1. EEI. Economic efficiency of Shanghai in 2008 is used as the ideal value for EEI, the other provinces' EEI is obtained via DEA model.
2. ESTI. In the 10 indicators listed by Ingles for modern society, one is that the tertiary industry accounts for over 50 % of GDP. The United Nations also use similar standard to separate rich and poor societies. Tertiary industries in most of the development countries account for around 70 % of GDP. China's goal for a moderately prosperous society is 50 % as well. Based on these numbers, we set the ideal value for ECI as 75 % of the GDP being tertiary industries [9]. In 2008, the added value of high-tech products accounted for 10.2 % of the added value of industrial outputs. In South Korea, the percentage reached 25.3 % in 2006, 17.2 % in the US, and 16.1 % in Japan. For that matter, we set the ideal value for China being 25 %.
3. ECI. In 2008, the average energy consumption in China is 1.1 ton of standard coal per 10,000 RMB Yuan, while Beijing was the lowest, 0.66 ton of standard coal per 10,000 RMB Yuan. Based on the current international negotiation on reducing carbon dioxide emission and potential advancement in science and technology, we set the ideal value being 0.48 ton of standard coal per 10,000 RMB Yuan. In 2008, the average water consumption was 234 $m^3$ per 10,000 RMB Yuan. Beijing again had the lowest value, i.e., 33 $m^3$ per 10,000 RMB Yuan. In Japan, the value is 25 $m^3$ per 10,000 RMB Yuan. We then set the ideal value being 30 $m^3$ per 10,000 RMB Yuan. Similarly, we set ideal values for wastewater, waste gas, and solid waste per 10,000 RMB Yuan GDP as 2 $m^3$ per 10,000 RMB Yuan, 5000 standard $m^3$ per 10,000 RMB Yuan, and 0.5 ton per 100 million RMB Yuan.
4. EGFI. From our empirical studies, the contribution of science and technology to economic development in China is around 39 %. In the US, Japan, and other developed countries, however, the value reaches approximately 80 %. We hence use this value (80 %) as our ideal value.

**Table 6.2** Indicator system for urbanization quality and their weights

| | Weight | Criterion layer | Weight | Index level | Unit | Dynamic judgment standard | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Criterion layer I | | Index level II | | 30 % | 60 % | 80 % | 100 % |
| Quality of economic urbanization | 0.400 | Economic efficiency index | 0.302 | Economic efficiency | – | 0.25 | 0.74 | 0.80 | 1 |
| | | Economic structure index | 0.283 | Third industry of GDP | % | 15 | 45 | 60 | 75 |
| | | | | High-tech products of manufacturing industry | % | 5 | 15 | 20 | 25 |
| | | Economic development cost index | 0.275 | Energy intensity | Mtce/ten thousand Yuan | 2.40 | 0.80 | 0.60 | 0.48 |
| | | | | Water consumption per ten thousand Yuan GDP | $m^3$/ten thousand Yuan | 200 | 66 | 50 | 30 |
| | | | | Waste water discharge per ten thousand Yuan of industrial added value | $m^3$/ten thousand Yuan | 20 | 8 | 4 | 2 |
| | | | | Waste gas discharge per ten thousand Yuan of industrial added value | $10^4$ standard $m^3$/ten thousand Yuan | 80 | 20 | 5 | 0.5 |
| | | | | Solid waste production per one hundred million Yuan of industrial added value | Ton per one hundred million Yuan | 80 | 20 | 5 | 0.5 |
| | | Economic growth dynamic index | 0.140 | Contribution rate of technology advancement | – | 17 | 50 | 70 | 80 |
| Quality of social urbanization | 0.350 | Human development index | 0.351 | Life expectancy | Year | 60 | 70 | 80 | 85 |
| | | | | Adult literacy | % | 65 | 90 | 100 | 100 |
| | | | | Per capita GDP | Ten thousand dollars | 1.5 | 2.5 | 3.2 | 4 |
| | | Social security index | 0.298 | Unemployment rate | % | 8.0 | 4.6 | 3.5 | 2.8 |
| | | | | Social security as a share of GDP | % | 6 | 18 | 25 | 30 |

(continued)

**Table 6.2** (continued)

| | Weight | Criterion layer | Weight | Index level | Unit | Dynamic judgment standard | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Criterion layer I | | Index level II | | 30 % | 60 % | 80 % | 100 % |
| Quality of social urbanization | 0.350 | | | Social security penetration rate | % | 25 | 75 | 100 | 100 |
| | | Infrastructure development index | 0.187 | Water penetration rate | % | 50 | 90 | 100 | 100 |
| | | | | Per capita living space | $m^2$ | 10 | 27.6 | 37 | 40 |
| | | | | Per capita road area | $m^2$ | 4 | 9.6 | 13 | 15 |
| | | | | Number of doctors per one thousand people | Number of people | 0.9 | 2.8 | 3.8 | 4.8 |
| | | | | Number of basic education teachers per 100 people | Number of people | 0.5 | 1.5 | 2 | 2.5 |
| | | Urban–rural integration index | 0.164 | Urban–rural income gap | – | 4.8 | 1.6 | 1.2 | 1 |
| Guarantee quality of spatial urbanization | 0.250 | Water resources security index | 0.250 | Water resources security capacity | – | 1 | 1 | 1 | 1 |
| | | Construction land security index | 0.250 | Construction land security capacity | – | 1 | 1 | 1 | 1 |
| | | Energy security index | 0.250 | Energy security capacity | – | 1 | 1 | 1 | 1 |
| | | Ecological security index | 0.250 | Air quality index | % | 40 | 75 | 100 | 100 |
| | | | | Forest coverage of built-up area | % | 20 | 37 | 50 | 55 |
| | | | | Sewage water treatment rate | % | 50 | 90 | 100 | 100 |
| | | | | Decontamination rate of urban refuse | % | 40 | 84 | 100 | 100 |
| | | | | Industrial solid waste utilization ratio | % | 40 | 72 | 90 | 100 |

5. HDI. UNDP issued three threshold values for HDI, namely, the life expectancy at birth being between 25 and 85; adult literacy rate being between 0 and 100 %, and average time of formal education being between 1 and 15; per capita GDP being between $100 and $40,000 ($100 is the international poverty line) [10]. With these variables, the United Nations calculated HDI for all countries with available data, and Iceland is the highest of 0.968 in 2007. China was 0.772 in 2007. The ideal value is set as 1.
6. SSI. The unemployment rate in China is obtained via surveys conducted by the National Bureau of Statistics' Demographic Department. It often refers to the registered unemployment rate. For China's current situation, the ideal value is set at 2.8 %. The social security coverage was set at 60 % per the national standard for moderately prosperous society. According to the requirement for establishing a complete social security system in the 16th Congress Report, and the demand for social security during the second tide of modernization in China (Modernization Report Group), we set the ideal value for national social security coverage to be 100 % (all covered). From literature search [11], the appropriate portion of social security in GDP is 25 %.
7. Infrastructure Development Index (IDI). The standard for per capital living space for China's moderately prosperous society is 12 $m^2$. The United Nations uses 15 $m^2$ as a standard to separate rich from non-rich. In 2008, the per capital urban living space reached 29 $m^2$ in China. Shanghai has the highest value, 35 $m^2$. So the ideal value for per capita living space is set at 40 $m^2$ [9]. In *Urban Planning Norms*, per capita road area is set as 7–15 $m^2$, so we set our ideal value as 15 $m^2$. In 2008, the national public transportation vehicle per 10,000 people is 11.1. We set our ideal value as 42. The Modernization Report Group predicts that China's urbanization level will reach 81 % by 2050, and 3.6 doctors per 1000. We set the ideal value for doctors per 1000 to be 4.8.
8. Urban and rural integration index (URII). The urban–rural income difference dropped from 2.6 (average urban income is 2.6 times that of average rural income) in 1978 to 1.8 in 1983. Yet by 2008, it reached 3.3. Reducing the income difference is critical for integrated urban and rural development. We then set the ideal value to be 1, indicating no difference or urbanization level reaches 100 %.
9. Water resource security index (WRSI). The ideal value is set to be 1 under the restriction of available water resources. 1 indicates a dynamic balance between sustainably available water resources and demands for urbanization.
10. Land construction security index (LCSI). From the equation for calculating LCSI, it is easy to see that the ideal value for LCSI shall be 1, indicating the construction land are within the sustainably available land resources.
11. Energy security index (ESI). Again, from the equation for calculating ESI, the ideal value shall be 1 so that the production and consumption can be balanced.
12. Eco-environment security index (EESI). In the Modernization Report Group's study, the ideal value for air quality is 100 %, though the ideal value for the moderately prosperous society is temporarily set at 80 %. We set the ideal value as 100 %. Ideal value for green coverage in urban proper is set as 55 % [12].

Ideal values for wastewater treatment rate, garbage disposal, and solid waste recycling rate are all set as 100 %.

### 6.2.3 Comprehensive Measuring Model for Urbanization Quality

#### 6.2.3.1 Comprehensive Measurement Model for Urbanization Quality

If $\alpha$, $\beta$, $\gamma$ are the weight for economic urbanization development quality, social urbanization development quality, and spatial urbanization security quality (land availability), then the comprehensive measurement model for urbanization development quality can be expressed as:

$$\begin{aligned} \mathrm{UDQ} &= \mathrm{EUDQ} \times \alpha + \mathrm{SUDQ} \times \beta + \mathrm{SUSQ} \times \gamma \\ &= \sum_{i=1}^{4} (\mathrm{EUDQ}_i)\alpha_i + \sum_{j=1}^{4} (\mathrm{SUDQ}_j)\beta_j + \sum_{k=1}^{4} (\mathrm{SUSQ}_k)\gamma_k \end{aligned}$$

#### 6.2.3.2 Measurement Models for the Subsystems of Urbanization Development Quality

1. Measurement model for economic urbanization development quality (EUDQ). Using $\omega_1$, $\omega_2$, $\omega_3$, $\omega_4$ to represent the weights for EEI, ESTI, ECI, EFI, and then the model for EUDQ is:

$$\mathrm{EUDQ} = \sum_{m=1}^{4} (\mathrm{EUDQ})_m \omega_m = \mathrm{EEI} \times \omega_1 + \mathrm{ESTI} \times \omega_2 + \mathrm{ECI} \times \omega_3 + \mathrm{EFI} \times \omega_4$$

2. Measurement model for social urbanization development quality (SUDQ). Using $\delta_1$, $\delta_2$, $\delta_3$, $\delta_4$ as weights for HDI, SSI, IDI, URII, we obtain the calculation for SUDQ as:

$$\mathrm{SUDQ} = \sum_{k=1}^{4} (\mathrm{SUDQ})_k \delta_k = \mathrm{HDI} \times \delta_1 + \mathrm{SSI} \times \delta_2 + \mathrm{IDI} \times \delta_3 + \mathrm{URII} \times \delta_4$$

3. Measurement model for spatial urbanization security quality. Using $\rho_1$, $\rho_2$, $\rho_3$, $\rho_4$ to represent the weights for WRSI, LCSI, PSI, EESI. We can obtain SUSQ as:

$$\mathrm{SUSQ} = \sum_{n=1}^{4} (\mathrm{SUSQ})_n \rho_n = \mathrm{WRSI} \times \rho_1 + \mathrm{LCSI} \times \rho_2 + \mathrm{PSI} \times \rho_3 + \mathrm{EESI} \times \rho_4$$

#### 6.2.3.3 Segmented Measures for Urbanization Development Quality

In the past, measuring urbanization development quality follows very standard approach in which if the actual value of a specific indicator is over the ideal value, the extra part of the indicator is often ignored (considered no contribution). Apparently this does agree well with the reality. To amend such scenario, we introduced the modified Atkinson model and calculated the contribution of the extra part:

$$W(x_i) = (x_i)^{1-\xi}$$

where $x_i$ is the actual value of the $i$th indicator, $W(x_i)$ is its contribution to urbanization quality. When the real value is over the ideal value $S_{xi}$, the contribution of the extra part will be calculated in segments. Since $x_i$ must be within any of these ranges: $[0, S_{xi}]$, $[S_{xi}, 2S_{xi}]$, $[2S_{xi}, 3S_{xi}]$ … $[nS_{xi}, (n + 1)S_{xi}]$, we assume that when $nS_{xi} < x_i \leq (n + 1)S_{xi}$, $\xi = n/(n + 1)$, (n = 0, 1, 2, …$n$). In so doing, using $\xi$ as the parameter, its value will belong to [0, 1). If $\xi = 0$, then $W(x_i) = x_i$. In general, we'll have:

$$\begin{aligned}
W(x_i) &= x_i, \quad (0 < x_i < S_{xi}) \\
&= S_{xi} + 2(x_i - S_{xi})^{1/2}, \quad (S_{xi} < x_i \leq 2S_{xi}) \\
&= S_{xi} + 2(S_{xi})^{1/2} + 3(x_i - 2S_{xi})^{1/3}, \quad (2S_{xi} < x_i \leq 3S_{xi}) \\
&\quad \cdots \\
&= S_{xi} + 2(S_{xi})^{1/2} + \cdots + (n+1)(x_i - nS_{xi})^{1/(n+1)}, \quad (nS_{xi} < x_i \leq (n+1)S_{xi})
\end{aligned}$$

To calibrate the above model, we use the constant value in 1980 for both GDP and fixed asset stock to generate the comprehensive measure of the urbanization quality. The data are obtained from "*Digital China Three Years—the Compilation of Statistics after 30 Years of Reform and Opening Up*" and annual "*China Statistical Yearbook*." In particular, the data for the high-tech industry are from "*China High-tech Industry Statistical Yearbook*." Data for tertiary industry and other industries are from the "*Statistical Yearbook of China*" and "China's Tertiary Industries Statistical Yearbook." Energy consumption data are from the "China Energy Statistical Yearbook." Field data were used to calculate some provincial total energy consumption. 10,000 RMB Yuan GDP water consumption data are from the "China Water Resources Bulletin." Field data were also used for some provinces. Data for air pollution, waste water treatment, garbage treatment, and other related environmental data are from the "Chinese Environment Statistical Yearbook," local "Statistical Yearbook," the "China Statistical Yearbook," and "Urban Construction Statistics Yearbook." Adult literacy rate data are from "China Education Statistics Yearbook." Data for calculating the HDI are from the annual "China Human Development Report." The registered urban unemployment rate is

from "China Population and Employment Statistics Yearbook" and "China Labor and Social Security Yearbook." Social security expenditure data are from "China Labor Statistical Yearbook." Provincial social security benefits expenditure, the special care and social welfare costs data are from "China Regional Economic Statistical Yearbook" and "China Statistical Yearbook of Civil Issues." Social security expenditure and GDP data are of the current year. The national and provincial water resources, agriculture, and urban water demand data are from the annual "China Water Resources Bulletin." The built-up area, nonagricultural population, and migrant population data are from the annual "China Urban Construction Statistics Annual Report" and "China Urban Construction Statistics Yearbook." The total amount of energy production and consumption data are from the "New China Fifty-five Years Statistics compilation," and the annual "Energy Statistics Yearbook." Sewage treatment rate is calculated based on the ratio between treated and totally discharged sewage data obtained from the annual "China Urban Construction Statistics Yearbook." Green coverage in urban proper area is also obtained from the annual "China Urban Construction Statistics Year book" and "China City Statistical Yearbook." The total population and urban population data are from the "Digital China Thirty Years–Compilation of Statistics after 30 Years of Reform and Opening-up." The proportion of non-agricultural employment is calculated based on employment in the secondary and tertiary industries data from the annual "China Statistical Yearbook." Chongqing's data are compiled from "Chongqing Statistical Yearbook" prior to 1997. In addition, due to incomplete data of Taiwan Province, Taiwan is not included in this study. Some missing values are interpolated via time series data.

## 6.3 Comprehensive Evaluation and Spatial Distribution of China's Urbanization Quality

Focusing on urbanization quality is now the trend of urbanization in the world. Some scholars have pointed out that urbanization is the "integrated development of number of cities, city size, regional and urbanization quality, urban structure, and urban functions." If urbanization in the twentieth century is mainly reflected in the number of cities, scale, and local development, then the twenty-first century urbanization should focus more on quality, structure, and the function of the cities, and to maintain a harmonious relationship with number, scale and local development. Deep development of urbanization will be the main theme of the twenty-first century urbanization in developing countries. China's urbanization has entered a period of rapid development. In past development, urbanization focuses way too much on urban population growth. The quality of urbanization has been largely ignored. This is because the traditional urbanization often simply uses a single demographic indicator to reflect the level of urbanization, which apparently does

not reflect the complete urbanization characteristics and nature. Urbanization rate and quality are two aspects of the development of urbanization. The rate is but the surface phenomenon. Urbanization quality is the actual essence. "Fast" urbanization without high quality is unsustainable urbanization. To this regard, the real focus of urban development is the development of urban quality [13].

### 6.3.1 China's Urbanization Quality is at the Middle Level

Our analysis suggests that the overall quality of China's urbanization is at the middle level, and slowly improving. On the other hand, the improvement rate of urbanization quality is currently slower than that of the urbanization rate. Using the above-mentioned integrated measurement model for urbanization quality, we are able to show that from 1980 to 2008, China UDQ value increased from 0.388 to 0.591, indicating the overall quality of urbanization is at the middle level, and is optimizing. As can be seen from Table 6.3, the urbanization quality in China fluctuates more than that of the urbanization rate. The overall quality is not high. Annual changing rate for urbanization quality is 0.75 %, and lower than the changing rate of urbanization levels, which is 0.89 %.

Using the calculation approaches adopted by the United Nations, we recalculated population urbanization between 1980 and 2008 in China, and found that in 1980–1985, there were some differences in the relative level of urbanization and industrialization, but the difference over the 23-year period (1986–2008) is only 1–2 %, indicating the model that is based on the coordination between urbanization level and quality is rather reliable to estimate urbanization level under certain urbanization quality. The result suggests that from 1980 to 2008, China's population urbanization level lags about 10 % comparing to the level of industrial development or comprehensive urbanization quality (Table 6.4).

### 6.3.2 Characteristics of Dynamic Conversion for China's Urbanization Quality

#### 6.3.2.1 Dynamics of China's Urbanization Quality in Different Stages

Despite the fact that from 1980 to 2008, urbanization quality in China has been optimizing and enhancing, the change is not steady. As a matter of fact, during this period, the urbanization quality can be divided into three rather different stages, namely, from 1980 to 1992, the stage of growth with fluctuations; from 1993 to 2005, the stage of steady growth; and from 2005 to 2008, the stage of accelerated growth. Our analysis suggests that China's urbanization quality index reduced from

**Table 6.3** Urbanization quality stages from 1980 to 2008

| Year | Quality of urbanization | Urbanization level/% | Amended urbanization level/% | Development phase of urbanization | Development phase of urbanization quality |
|---|---|---|---|---|---|
| 1980 | 0.388 | 19.39 | 19.84 | Initial phase | Optimization phase |
| 1981 | 0.368 | 20.16 | 20.53 | Initial phase | Optimization phase |
| 1982 | 0.399 | 21.13 | 21.22 | Initial phase | Optimization phase |
| 1983 | 0.430 | 21.62 | 21.91 | Initial phase | Optimization phase |
| 1984 | 0.439 | 23.01 | 23.52 | Initial phase | Optimization phase |
| 1985 | 0.442 | 23.71 | 24.44 | Initial phase | Optimization phase |
| 1986 | 0.433 | 24.52 | 25.50 | Initial phase | Optimization phase |
| 1987 | 0.436 | 25.32 | 26.55 | Initial phase | Optimization phase |
| 1988 | 0.441 | 25.81 | 27.28 | Initial phase | Optimization phase |
| 1989 | 0.417 | 26.21 | 27.93 | Initial phase | Optimization phase |
| 1990 | 0.418 | 26.41 | 28.35 | Initial phase | Optimization phase |
| 1991 | 0.465 | 26.94 | 28.53 | Initial phase | Optimization phase |
| 1992 | 0.485 | 27.46 | 30.12 | Middle phase | Optimization phase |
| 1993 | 0.475 | 27.99 | 30.90 | Middle phase | Optimization phase |
| 1994 | 0.476 | 28.51 | 31.65 | Middle phase | Optimization phase |
| 1995 | 0.478 | 29.04 | 32.33 | Middle phase | Optimization phase |
| 1996 | 0.482 | 30.48 | 32.91 | Middle phase | Optimization phase |
| 1997 | 0.493 | 31.91 | 33.75 | Middle phase | Optimization phase |
| 1998 | 0.520 | 33.35 | 34.51 | Middle phase | Optimization phase |
| 1999 | 0.506 | 34.78 | 35.28 | Middle phase | Optimization phase |
| 2000 | 0.519 | 36.22 | 36.25 | Middle phase | Optimization phase |
| 2001 | 0.521 | 37.66 | 37.66 | Middle phase | Optimization phase |
| 2002 | 0.530 | 39.09 | 39.09 | Middle phase | Optimization phase |
| 2003 | 0.537 | 40.53 | 40.53 | Middle phase | Optimization phase |
| 2004 | 0.529 | 41.76 | 41.76 | Middle phase | Optimization phase |
| 2005 | 0.517 | 42.99 | 42.99 | Middle phase | Optimization phase |
| 2006 | 0.555 | 43.90 | 43.90 | Middle phase | Optimization phase |
| 2007 | 0.578 | 44.94 | 44.94 | Middle phase | Optimization phase |
| 2008 | 0.591 | 45.68 | 45.68 | Middle phase | Optimization phase |

0.388 in 1980 to 0.368 in 1981, but grew from 1981 to 1985. Urbanization quality from 1986 to 1988 changed very little. From 1988 to 1990, however, it experienced a sharp decline. After an accelerating growth from 1990 to 1992, it entered the stable growth period. From 1993 to 2005, China's urbanization quality had very little fluctuations except for some sudden rise and fall before and after 1998. From 2005 to 2008 China's urbanization quality experienced accelerated growth, with an average annual growth of 3.58 %, much higher than the average annual growth of population urbanization level (Fig. 6.4).

**Table 6.4** China's urbanization quality and level comparison

| Year | UDQ | Urbanization level/%[a] | Amended urbanization level/%[b] | Industrialization level/%[c] | Lag percentage/%[d] | Urbanization level based on UDQ/%[e] | Lag percentage/%[f] |
|---|---|---|---|---|---|---|---|
| 1980 | 0.372 | 19.39 | 19.84 | 31.30 | 11.46 | 37.16 | 17.32 |
| 1985 | 0.417 | 23.71 | 24.44 | 37.60 | 13.16 | 41.68 | 17.24 |
| 1990 | 0.396 | 26.41 | 28.35 | 39.90 | 11.55 | 39.64 | 11.29 |
| 1995 | 0.469 | 29.04 | 32.33 | 47.80 | 15.47 | 46.91 | 14.58 |
| 2000 | 0.509 | 36.22 | 36.25 | 50.00 | 13.75 | 50.91 | 14.66 |
| 2005 | 0.509 | 42.99 | 42.99 | 55.20 | 12.21 | 50.85 | 7.86 |
| 2006 | 0.559 | 43.90 | 43.90 | 57.40 | 13.50 | 55.95 | 12.05 |
| 2007 | 0.583 | 44.94 | 44.94 | 59.20 | 14.26 | 58.27 | 13.33 |
| 2008 | 0.589 | 45.68 | 45.68 | 60.40 | 14.72 | 58.93 | 13.25 |

[a]Is China's urbanization rate calculated based on the proportion of urbanization population in total population; [b]Is China's urbanization rate amended based on the UN's method; [c]Is the industrialization level calculated based on the proportion of non-agricultural labors in total labors, which is another method appropriate for comparison with the level of urbanization development; [d]Is the value indicating how urbanization lags behind industrialization by correcting based the UN's method; [e]Is China's urbanization rate calculated based on compatibility model for speed and UDQ in this paper; [f]Is the value indicating how urbanization corrected based on the UN'S method lags behind that calculated based on compatibility measurement model for level and UDQ

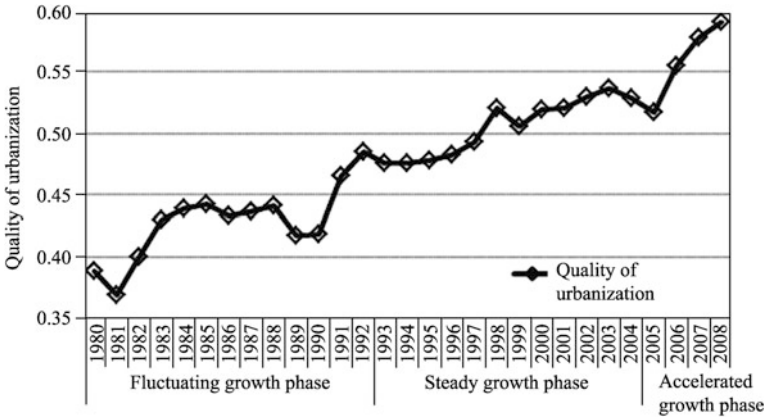


**Fig. 6.4** Illustration of China's urbanization quality dynamics from 1980 to 2008

#### 6.3.2.2 Characteristics of China's Urbanization Quality in Different Stages

In this study, we use $v_{-}^{-}, v^{-}, v^{+}$, and $v_{+}^{+}$ to represent the early stages ($0 < v \leq 30$ %), mid-stage ($30\ \% < v \leq 60$ %), late stage ($60\ \% < v \leq 80$ %), and final stage ($80\ \% < v \leq 100$ %) of urbanization development, which correspond to low, low to middle, middle to high, and high level of urbanization. In the meantime, we use $q_{-}^{-}, q^{-}, q^{+}$, and $q_{+}^{+}$ to represent the initial stages ($0 < v \leq 0.3$), optimization and upgrading stage ($0.3 < v \leq 0.6$), the late stage ($0.6 < v \leq 0.8$), and sustainable development stage ($0.8 < v \leq 1$) of urbanization quality, which also correspond to low, low to middle, middle to high, and high quality of urbanization. With these symbols, we found that from 1990 to 2000 urbanization quality has been optimizing and enhancing, but the level of urbanization experienced larger difference. For instance, Beijing, Tianjin, and Shanghai entered into the later stages of urbanization. Yet by 2005, although Beijing and Shanghai entered the final stage of urbanization, their urbanization qualities were 0.60 and 0.56, respectively, which is still in the late stages of improvement, optimization, and upgrading. In the meantime, Tianjin and Heilongjiang's (with urbanization level at 72.8 and 54.4 %) urbanization quality was in the late stage with urbanization quality index being 0.64 and 0.62, respectively. During this period, most other provinces (and municipalities) are still in the stage of optimizing and improving the urbanization quality. Urbanization quality and level changed very little from 2005 to 2008 except for Heilongjiang that experienced slight decline. Beijing and Shanghai's urbanization quality had entered the final stages of urbanization, their urbanization qualities were still lagging behind Tianjin, which is in the later stages of urbanization. By 2008, Beijing and Shanghai have entered the final stage of urbanization, but the urbanization quality indices are only 0.64 and 0.60. This is mainly because of the severe lack of water resources and the ESI is low in Beijing, Shanghai, it is difficult to meet the needs of urban development (Table 6.5).

**Table 6.5** Conversion table for different types of urbanization development in provincial areas from 1990 to 2008

| | 1990 | | | 1995 | | | 2000 | | | 2005 | | | 2008 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Code | V | Q | C | V | Q | C | V | Q | C | V | Q | C | V | Q | C |
| Beijing | 68.9 | 0.38 | $v^+q^-$ | 72.6 | 0.46 | $v^+q^-$ | 77.6 | 0.52 | $v^+q^-$ | 80.2 | 0.60 | $v_+^+q^-$ | 84.9 | 0.64 | $v_+^+q^+$ |
| Tianjin | 70.9 | 0.42 | $v^+q^-$ | 70.8 | 0.48 | $v^+q^-$ | 72.0 | 0.54 | $v^+q^-$ | 72.8 | 0.64 | $v^+q^+$ | 77.2 | 0.69 | $v^+q^+$ |
| Hebei | 19.1 | 0.35 | $v_-q^-$ | 22.8 | 0.42 | $v_-q^-$ | 26.2 | 0.43 | $v_-q^-$ | 30.1 | 0.46 | $v^-q^-$ | 41.9 | 0.46 | $v^-q^-$ |
| Shanxi | 30.1 | 0.40 | $v^-q^-$ | 32.4 | 0.48 | $v^-q^-$ | 35.1 | 0.50 | $v^-q^-$ | 39.0 | 0.52 | $v^-q^-$ | 45.1 | 0.53 | $v^-q^-$ |
| Inner Mongolia | 36.2 | 0.45 | $v^-q^-$ | 38.7 | 0.47 | $v^-q^-$ | 42.8 | 0.50 | $v^-q^-$ | 46.4 | 0.53 | $v^-q^-$ | 51.7 | 0.55 | $v^-q^-$ |
| Liaoning | 49.8 | 0.47 | $v^-q^-$ | 53.0 | 0.51 | $v^-q^-$ | 54.4 | 0.54 | $v^-q^-$ | 57.2 | 0.58 | $v^-q^-$ | 60.1 | 0.57 | $v^+q^-$ |
| Jilin | 46.9 | 0.39 | $v^-q^-$ | 49.9 | 0.46 | $v^-q^-$ | 49.8 | 0.51 | $v^-q^-$ | 52.2 | 0.53 | $v^-q^-$ | 53.2 | 0.56 | $v^-q^-$ |
| Heilongjiang | 48.7 | 0.47 | $v^-q^-$ | 50.6 | 0.52 | $v^-q^-$ | 51.6 | 0.56 | $v^-q^-$ | 54.4 | 0.62 | $v^+q^+$ | 55.4 | 0.57 | $v^-q^-$ |
| Shanghai | 72.6 | 0.38 | $v^+q^-$ | 82.1 | 0.44 | $v_+^+q^-$ | 88.5 | 0.52 | $v_+^+q^-$ | 92.0 | 0.56 | $v_+^+q^-$ | 88.6 | 0.60 | $v_+^+q^-$ |
| Jiangsu | 24.8 | 0.33 | $v_-q^-$ | 31.6 | 0.44 | $v^-q^-$ | 41.8 | 0.48 | $v^-q^-$ | 49.7 | 0.54 | $v^-q^-$ | 54.3 | 0.54 | $v^-q^-$ |
| Zhejiang | 36.5 | 0.35 | $v^-q^-$ | 41.7 | 0.46 | $v^-q^-$ | 48.9 | 0.47 | $v^-q^-$ | 55.0 | 0.55 | $v^-q^-$ | 57.6 | 0.56 | $v^-q^-$ |
| Anhui | 19.6 | 0.34 | $v_-q^-$ | 24.7 | 0.42 | $v_-q^-$ | 28.0 | 0.48 | $v_-q^-$ | 32.3 | 0.56 | $v^-q^-$ | 40.5 | 0.57 | $v^-q^-$ |
| Fujian | 29.3 | 0.40 | $v_-q^-$ | 36.6 | 0.49 | $v^-q^-$ | 41.8 | 0.50 | $v^-q^-$ | 47.6 | 0.53 | $v^-q^-$ | 49.9 | 0.56 | $v^-q^-$ |
| Jiangxi | 23.2 | 0.37 | $v_-q^-$ | 26.2 | 0.42 | $v_-q^-$ | 27.8 | 0.48 | $v_-q^-$ | 30.0 | 0.51 | $v_-q^-$ | 41.4 | 0.53 | $v^-q^-$ |
| Shandong | 31.1 | 0.37 | $v^-q^-$ | 37.6 | 0.47 | $v^-q^-$ | 38.2 | 0.49 | $v^-q^-$ | 43.8 | 0.58 | $v^-q^-$ | 47.6 | 0.56 | $v^-q^-$ |
| Henan | 17.8 | 0.35 | $v_-q^-$ | 21.7 | 0.42 | $v_-q^-$ | 23.3 | 0.45 | $v_-q^-$ | 25.9 | 0.52 | $v_-q^-$ | 36.0 | 0.50 | $v^-q^-$ |
| Hubei | 29.4 | 0.36 | $v_-q^-$ | 36.9 | 0.44 | $v^-q^-$ | 40.5 | 0.48 | $v^-q^-$ | 47.4 | 0.52 | $v^-q^-$ | 45.2 | 0.55 | $v^-q^-$ |
| Hunan | 20.7 | 0.39 | $v_-q^-$ | 25.6 | 0.41 | $v_-q^-$ | 29.9 | 0.46 | $v_-q^-$ | 34.9 | 0.50 | $v^-q^-$ | 42.2 | 0.53 | $v^-q^-$ |
| Guangdong | 39.8 | 0.38 | $v^-q^-$ | 52.8 | 0.47 | $v^-q^-$ | 55.4 | 0.51 | $v^-q^-$ | 65.0 | 0.56 | $v^+q^-$ | 63.4 | 0.58 | $v^+q^-$ |
| Guangxi | 17.8 | 0.41 | $v_-q^-$ | 25.3 | 0.42 | $v_-q^-$ | 28.4 | 0.44 | $v_-q^-$ | 33.9 | 0.48 | $v^-q^-$ | 38.2 | 0.53 | $v^-q^-$ |
| Hainan | 24.7 | 0.43 | $v_-q^-$ | 30.9 | 0.57 | $v^-q^-$ | 41.8 | 0.59 | $v^-q^-$ | 43.2 | 0.50 | $v^-q^-$ | 48.0 | 0.54 | $v^-q^-$ |
| Chongqing | 17.2 | 0.36 | $v_-q^-$ | 26.7 | 0.43 | $v_-q^-$ | 33.4 | 0.45 | $v^-q^-$ | 34.8 | 0.47 | $v^-q^-$ | 50.0 | 0.50 | $v^-q^-$ |

(continued)

**Table 6.5** (continued)

| | 1990 | | | 1995 | | | 2000 | | | 2005 | | | 2008 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Code | V | Q | C | V | Q | C | V | Q | C | V | Q | C | V | Q | C |
| Sichuan | 19.5 | 0.34 | v_q | 24.7 | 0.48 | v_q | 26.7 | 0.46 | v_q | 30.7 | 0.49 | v q | 37.4 | 0.51 | v q |
| Guizhou | 21.4 | 0.34 | v_q | 23.8 | 0.39 | v_q | 23.9 | 0.39 | v_q | 25.2 | 0.49 | v_q | 29.1 | 0.50 | v_q |
| Yunnan | 17.6 | 0.44 | v_q | 20.4 | 0.51 | v_q | 23.5 | 0.54 | v_q | 26.7 | 0.56 | v_q | 33.0 | 0.60 | v q |
| Tibet | 12.1 | 0.38 | v_q | 15.9 | 0.39 | v_q | 19.0 | 0.46 | v_q | 22.1 | 0.47 | v_q | 22.6 | 0.52 | v_q |
| Shaanxi | 25.6 | 0.35 | v_q | 28.5 | 0.46 | v_q | 32.4 | 0.49 | v q | 36.2 | 0.52 | v q | 42.1 | 0.53 | v q |
| Gansu | 20.7 | 0.31 | v_q | 22.5 | 0.38 | v_q | 24.1 | 0.43 | v_q | 26.6 | 0.47 | v_q | 32.2 | 0.52 | v q |
| Qinghai | 32.1 | 0.44 | v q | 33.7 | 0.43 | v q | 34.9 | 0.49 | v q | 39.0 | 0.51 | v q | 40.9 | 0.56 | v q |
| Ningxia | 29.7 | 0.33 | v_q | 32.2 | 0.39 | v q | 32.5 | 0.42 | v q | 35.2 | 0.43 | v q | 45.0 | 0.46 | v q |
| Xinjiang | 32.8 | 0.45 | v q | 33.9 | 0.45 | v q | 33.9 | 0.51 | v q | 35.3 | 0.53 | v q | 39.6 | 0.54 | v q |

*Note* V is the urbanization rate corrected based on UN's method, namely regional urbanization level, Q is the quality of regional urbanization development, and C is the type of urbanization development

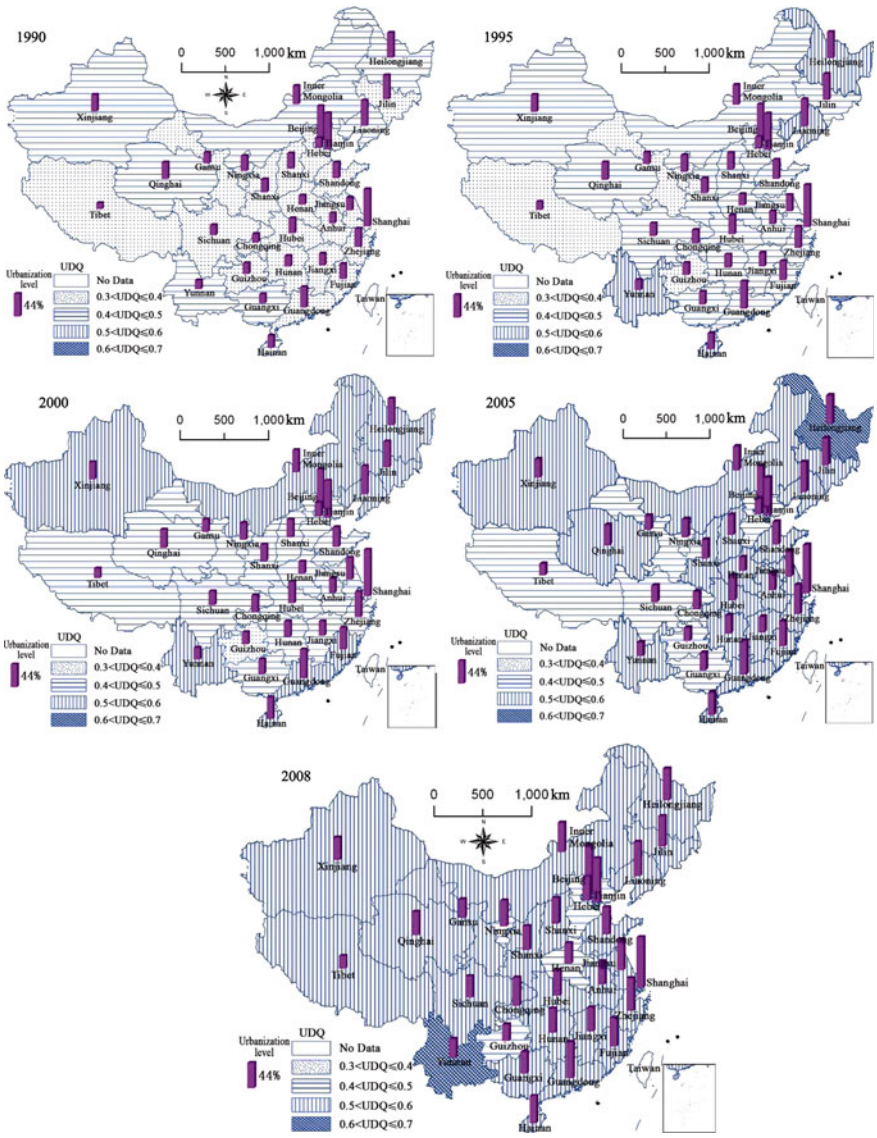


**Fig. 6.5** Spatiotemporal correspondence analysis on quality and level of urbanization development all around China from 1990 to 2008

To show the spatial differences of urbanization quality at provincial level, using the calculated results of urbanization quality from 1990 to 2008, we categorize urbanization quality that are at the optimizing and upgrading stage ($0.3 < \text{UDQ} \leq 0.6$) and later improved and complete stage ($0.6 < \text{UDQ} \leq 0.8$)

further into four hierarchical stages, namely, $0.3 < UDQ \leq 0.4$, $0.4 < UDQ \leq 0.5$, $0.5 < UDQ \leq 0.6$, $0.6 < UDQ \leq 0.7$ (Fig. 6.5).

### 6.3.3 *Spatial Distribution of China's Urbanization Quality*

China's Provincial urbanization quality in general increases during the past decades. The spatiotemporal dynamics follows an "inland regions improve first → coastal regions improve afterwards → inland regions increase again → coastal regions increase" overall improvement changing path. Except for a decline of urbanization quality (per our calculation) in Heilongjiang during 2005–2008, urbanization quality for the rest of the provinces (and provincial municipalities and autonomous regions) has been improving. The general spatial dynamic path of urbanization quality improvement, however, is almost an exact opposite as the improvement of urbanization level (calculated by the percentage of urban residents), in which coastal regions almost always improve earlier than inland regions. In 1990, urbanization quality of inland region is higher than that of the coastal region. Urbanization quality indices for Xinjiang, Qinghai, Inner Mongolia, Yunnan, Guangxi, and Heilongjiang are over 0.40, while in the coastal region, only Tianjin, Liaoning, Hainan's UDQs are over 0.40. Beijing and Shanghai's indices are 0.378 and 0.381, respectively. During 1995–2000, urbanization quality for coastal regions continues to improve, but are still lower than inland regions, such as in Xinjiang, Qinghai, Inner Mongolia, Heilongjiang, and Yunnan. In 2005, however, urbanization quality in the coastal regions started to lead the way, with Beijing, Tianjin, and Heilongjiang being the highest, their UDQs were 0.603, 0.637, and 0.624, respectively. In 2008, except for Guizhou, Henan, Hebei, and Ningxia, the UDQs for the remaining provinces have all reached over 0.50. Among them, the UDQs for Beijing, Tianjin, Shanghai, and Yunnan were the highest, namely, 0.636, 0.688, 0.600, and 0.602, respectively. Urbanization quality has a nationwide improvement then.

### 6.3.4 *Classification of China's Urbanization Quality*

#### 6.3.4.1 Subsystems of Urbanization Quality and Their Spatiotemporal Dynamics

Among the three subsystems of urbanization quality, the general trend is that economic urbanization quality < social urbanization quality < space security urbanization quality (land use availability) (Table 6.6). Land use availability (space security urbanization quality) is always the highest, from 1980s 0.815 increased to

**Table 6.6** The subsystems of China's urbanization quality from 1980 to 2008

| Year | Quality of economic urbanization | Quality of social urbanization | Guarantee quality of spatial urbanization | Comprehensive development quality of urbanization | Year | Quality of economic urbanization | Quality of social urbanization | Guarantee quality of spatial urbanization | Comprehensive development quality of urbanization |
|---|---|---|---|---|---|---|---|---|---|
| 1980 | 0.124 | 0.384 | 0.815 | 0.388 | 1995 | 0.270 | 0.484 | 0.805 | 0.478 |
| 1981 | 0.088 | 0.402 | 0.768 | 0.368 | 1996 | 0.267 | 0.500 | 0.802 | 0.482 |
| 1982 | 0.152 | 0.431 | 0.747 | 0.399 | 1997 | 0.281 | 0.505 | 0.816 | 0.493 |
| 1983 | 0.180 | 0.452 | 0.797 | 0.430 | 1998 | 0.278 | 0.511 | 0.920 | 0.520 |
| 1984 | 0.196 | 0.452 | 0.811 | 0.439 | 1999 | 0.290 | 0.516 | 0.839 | 0.506 |
| 1985 | 0.199 | 0.451 | 0.820 | 0.442 | 2000 | 0.317 | 0.522 | 0.839 | 0.519 |
| 1986 | 0.167 | 0.451 | 0.834 | 0.433 | 2001 | 0.319 | 0.523 | 0.841 | 0.521 |
| 1987 | 0.195 | 0.452 | 0.801 | 0.436 | 2002 | 0.333 | 0.509 | 0.876 | 0.530 |
| 1988 | 0.204 | 0.454 | 0.802 | 0.441 | 2003 | 0.337 | 0.513 | 0.890 | 0.537 |
| 1989 | 0.152 | 0.454 | 0.789 | 0.417 | 2004 | 0.348 | 0.524 | 0.826 | 0.529 |
| 1990 | 0.134 | 0.472 | 0.798 | 0.418 | 2005 | 0.363 | 0.530 | 0.748 | 0.517 |
| 1991 | 0.249 | 0.473 | 0.801 | 0.465 | 2006 | 0.390 | 0.533 | 0.850 | 0.555 |
| 1992 | 0.273 | 0.472 | 0.841 | 0.485 | 2007 | 0.432 | 0.545 | 0.857 | 0.578 |
| 1993 | 0.268 | 0.470 | 0.812 | 0.475 | 2008 | 0.428 | 0.556 | 0.900 | 0.591 |
| 1994 | 0.275 | 0.477 | 0.794 | 0.476 | – | – | – | – | – |

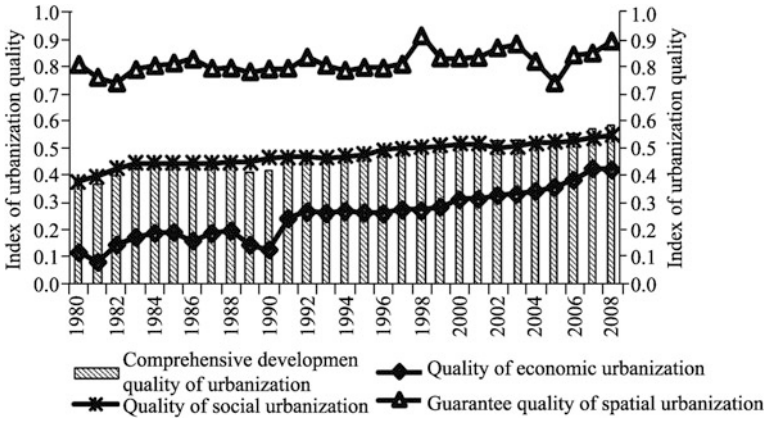


**Fig. 6.6** The dynamics of China's urbanization quality and its subsystems

0.900 in 2008. Social urbanization quality shows a rather similar improving path as the one of the general urbanization quality, changing form 0.384 in 1980 to 0.556 in 2008, with a slow annual increase rate of 0.59 %. Economic urbanization quality increased from 0.124 in 1980 to 0.428 in 2008, with an annual increase rate at 1.05 %, higher than the one for the overall urbanization quality (0.75 %), and almost twice that of the increasing rate for social urbanization quality. Comparing to social and space security urbanization quality, however, the overall economic urbanization quality is still too low (Fig. 6.6).

#### 6.3.4.2 Spatial Distribution of China's Urbanization Quality Subsystems

The provincial urbanization quality subsystems show rather clear spatial pattern (Fig. 6.7). In the Eastern China, the economic and social urbanization quality is higher than the inland areas, while the space security urbanization quality is lower. In 2008, the economic and social urbanization quality indices (on average) are 0.512 and 0.624, respectively, while in the Central and Western China, they are 0.355 and 0.531. As for space security urbanization quality, the average index for the Eastern provinces is only about two thirds of that in the Central and Western China. This is especially true for Beijing and Shanghai, for instance, in 2008, their space security indices are only 0.400. The provincial level urbanization quality subsystems follow the same pattern as the national level urbanization quality subsystems. From 1990 to 2008, except for Beijing, Tianjin, Shanghai and Jiangsu, space security urbanization quality for the remaining provinces is always higher than the social and economic urbanization quality, while the social urbanization quality is clearly higher than the economic urbanization quality (Fig. 6.7).

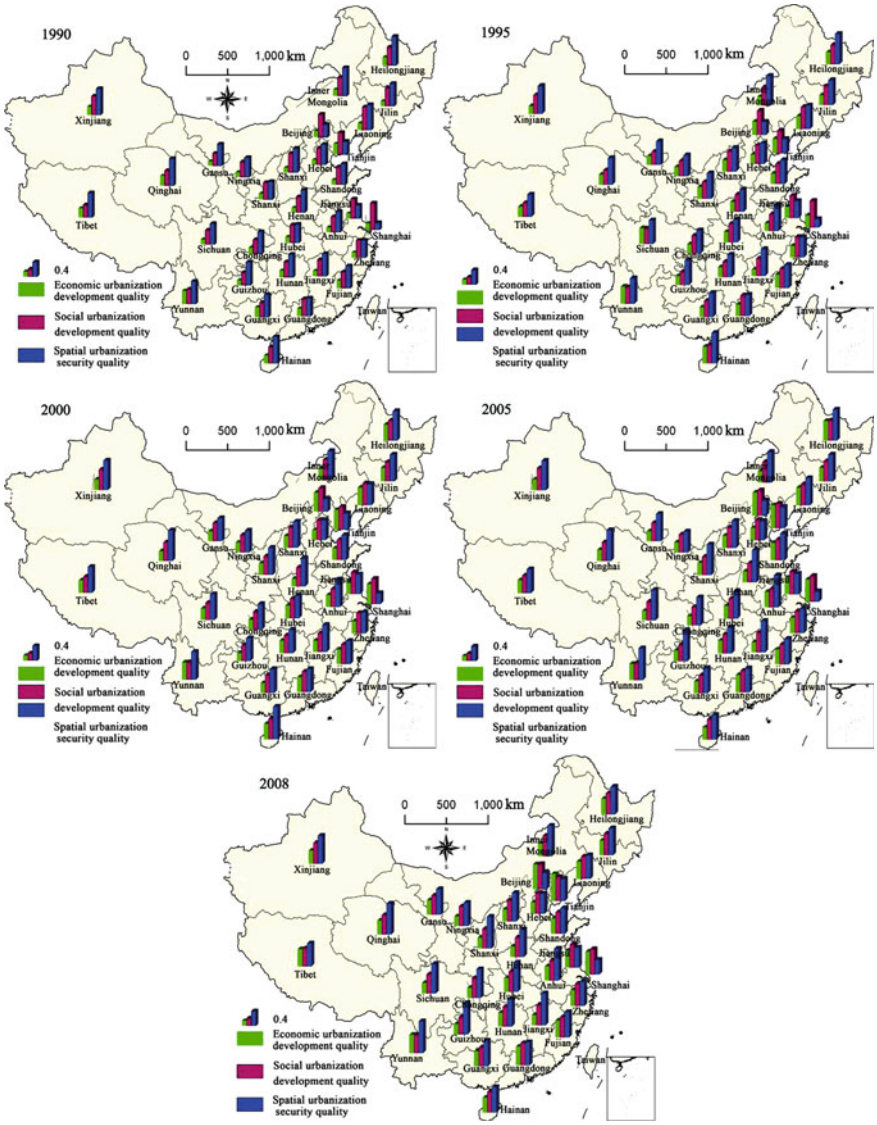


**Fig. 6.7** Provincial level urbanization quality subsystems spatial pattern from 1990 to 2008

## *6.3.5 Components of China's Urbanization Quality*

From above narration, we can see that the urbanization quality subsystems have clear spatial pattern. To further understand the pressing issues of urbanization quality, we analyze urbanization quality from the individual perspectives of economic efficiency, economic structure, economic development cost, economic

growing force, HDI, social security level, IDI, urban and rural integration, water resources security, construction land availability, energy security capacity, and eco-environmental security capacity. At the provincial level, we focus on 1990, 2000, and 2008.

#### 6.3.5.1 Temporal Dynamics of Urbanization Quality Subsystems

1. Economic urbanization quality subsystem. From the individual indicators level, the national EEI and economic structure index increase gradually, from 0.047 and 0.212 in 1980 to 0.516 and 0.492 in 2008. Among these two, EEI increases faster than economic structure index. Economic growth force index fluctuates quite wildly, with the highest of 0.67 in 1992 and lowest of close to 0 in 1990. Its fluctuation during 1996–2008 is relatively small with an increasing trend. The economic development cost index is fairly high, though gradually decreasing from 0.982 in 1980 to 0.806 in 2008. The reason for the high level of economic development cost index is mainly because the component indicators, namely energy consumption (1.1 ton standard coal per 10,000 Yuan in 2008), water consumption (243 tons per 10,000 Yuan in 2008) and waste disposal per 10,000 RMB Yuan GDP (in 2008, wasted gas release was 300 million cubic meters; waste water discharge was 18.7 cubic meters per 10,000 RMB Yuan; and industrial solid waste discharge was 60.5 tons per 10,000 RMB Yuan) were fairly high. They become the bottle neck components for low level of economic urbanization quality. Apparently, comparing to the overall urbanization quality level, the economic development costs and economic structure components lag far behind (Table 6.7).
2. Social urbanization quality subsystem. The HDI and IDI increased from 0.533 and 0.326 in 1980 to 0.793 and 0.663 in 2008. SSI increased marginally from 0.236 in 1980 to 0.358 in 2008. It lagged behind the overall level of urbanization quality and urban level. Urban and rural integration index increased from 0.401 in 1980 to 0.549 in 1983, but was declining ever since. This is witnessed by the gradual increase in the gap between urban and rural areas (Table 6.8).
3. Space security urbanization quality subsystem. Among the components of space security urbanization quality subsystem, water security index has the highest value, with more than 1.50 for our study period. It is followed by ESI. This indicates that high security level of water resources is the primary reason for a high space security urbanization quality. Construction land protection index decreased from 0.835 in 1980 to 0.601 in 1990, while showed an upward trend in 1991–2008, and was close to 1 in 2008. The temporal dynamics showed a typical "U" shape. Ecological environment protection index gradually increased from 0.167 in 1980 to 0.664 in 2008, higher than the overall urbanization quality. Comparing to the overall space security urbanization quality, however, ecological environment protection index is relatively low, and actually the "bottleneck" component for continuous improvement of space security

**Table 6.7** The components of economic urbanization quality subsystems from 1980 to 2008 in China

| Year | Economic efficiency index | Economic structure inde x | Economic growth dynamic index | Economic development cost index | Quality of economic urbanization | Year | Economic efficiency index | Economic structure index | Economic growth dynamic index | Economic development cost index | Quality of economic urbanization |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1980 | 0.047 | 0.212 | 0.259 | 0.982 | 0.124 | 1995 | 0.238 | 0.350 | 0.434 | 0.912 | 0.270 |
| 1981 | 0.048 | 0.218 | 0.041 | 0.980 | 0.088 | 1996 | 0.256 | 0.349 | 0.372 | 0.903 | 0.267 |
| 1982 | 0.050 | 0.220 | 0.398 | 0.978 | 0.152 | 1997 | 0.263 | 0.366 | 0.396 | 0.892 | 0.281 |
| 1983 | 0.054 | 0.227 | 0.536 | 0.976 | 0.180 | 1998 | 0.259 | 0.392 | 0.327 | 0.882 | 0.278 |
| 1984 | 0.061 | 0.251 | 0.571 | 0.974 | 0.196 | 1999 | 0.256 | 0.413 | 0.354 | 0.872 | 0.290 |
| 1985 | 0.071 | 0.288 | 0.507 | 0.972 | 0.199 | 2000 | 0.263 | 0.439 | 0.435 | 0.859 | 0.317 |
| 1986 | 0.076 | 0.295 | 0.305 | 0.970 | 0.167 | 2001 | 0.269 | 0.454 | 0.397 | 0.850 | 0.319 |
| 1987 | 0.083 | 0.302 | 0.435 | 0.968 | 0.195 | 2002 | 0.273 | 0.475 | 0.431 | 0.848 | 0.333 |
| 1988 | 0.097 | 0.313 | 0.441 | 0.964 | 0.204 | 2003 | 0.282 | 0.489 | 0.418 | 0.849 | 0.337 |
| 1989 | 0.105 | 0.329 | 0.097 | 0.961 | 0.152 | 2004 | 0.321 | 0.489 | 0.405 | 0.841 | 0.348 |
| 1990 | 0.104 | 0.327 | 0.000 | 0.958 | 0.134 | 2005 | 0.355 | 0.497 | 0.411 | 0.838 | 0.363 |
| 1991 | 0.116 | 0.349 | 0 592 | 0.955 | 0.249 | 2006 | 0.394 | 0.502 | 0.473 | 0.827 | 0.390 |
| 1992 | 0.135 | 0.361 | 0.666 | 0.948 | 0.273 | 2007 | 0.460 | 0.503 | 0.583 | 0.817 | 0.432 |
| 1993 | 0.165 | 0.354 | 0.582 | 0.938 | 0.268 | 2008 | 0.516 | 0.492 | 0.463 | 0.806 | 0.428 |
| 1994 | 0.208 | 0.356 | 0.523 | 0.923 | 0.275 | – | – | – | – | – | – |

**Table 6.8** The components of social urbanization quality subsystems from 1980 to 2008 in China

| Year | Human development index | Infrastructure development index | Social security index | Urban–rural integration index | Quality of social urbanization | Year | Human development index | Infrastructure development index | Social security index | Urban–rural integration index | Quality of social urbanization |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1980 | 0.533 | 0.326 | 0.236 | 0.401 | 0.384 | 1995 | 0.657 | 0.396 | 0.400 | 0.368 | 0.484 |
| 1981 | 0.538 | 0.275 | 0.294 | 0.446 | 0.402 | 1996 | 0.669 | 0.452 | 0.389 | 0.398 | 0.500 |
| 1982 | 0.543 | 0.291 | 0.342 | 0.505 | 0.431 | 1997 | 0.681 | 0.463 | 0.380 | 0.405 | 0.505 |
| 1983 | 0.548 | 0.284 | 0.386 | 0.549 | 0.452 | 1998 | 0.693 | 0.475 | 0.382 | 0.399 | 0.511 |
| 1984 | 0.553 | 0.279 | 0.386 | 0.545 | 0.452 | 1999 | 0.705 | 0.492 | 0.387 | 0.378 | 0.516 |
| 1985 | 0.556 | 0.273 | 0.386 | 0.538 | 0.451 | 2000 | 0.719 | 0.503 | 0.397 | 0.359 | 0.522 |
| 1986 | 0.560 | 0.322 | 0.392 | 0.470 | 0.451 | 2001 | 0.730 | 0.563 | 0.359 | 0.345 | 0.523 |
| 1987 | 0.564 | 0.323 | 0.393 | 0.462 | 0.452 | 2002 | 0.740 | 0.517 | 0.342 | 0.321 | 0 509 |
| 1988 | 0.568 | 0.325 | 0.395 | 0.462 | 0.454 | 2003 | 0.755 | 0.546 | 0.326 | 0.310 | 0.513 |
| 1989 | 0.572 | 0.333 | 0.397 | 0.438 | 0.454 | 2004 | 0.755 | 0.592 | 0.334 | 0.312 | 0.524 |
| 1990 | 0.608 | 0.336 | 0.404 | 0.454 | 0.472 | 2005 | 0.756 | 0.615 | 0.339 | 0.310 | 0.530 |
| 1991 | 0.618 | 0.358 | 0.404 | 0.417 | 0.473 | 2006 | 0.763 | 0.614 | 0.347 | 0.305 | 0.533 |
| 1992 | 0.628 | 0.367 | 0.401 | 0.387 | 0.472 | 2007 | 0.772 | 0.641 | 0.361 | 0.300 | 0.545 |
| 1993 | 0.638 | 0.370 | 0.399 | 0.358 | 0.470 | 2008 | 0.793 | 0.663 | 0.358 | 0.302 | 0.556 |
| 1994 | 0.648 | 0.377 | 0.412 | 0.349 | 0.477 | – | – | – | – | – | – |

**Table 6.9** The components of space security urbanization quality subsystems from 1980 to 2008 in China

| Year | Water resources security index | Construction land security index | Energy security index | Ecological security index | Guarantee quality of spatial urbanization | Year | Water resources security index | Construction land security index | Energy security index | Ecological security index | Guarantee quality of spatial urbanization |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1980 | 1.200 | 0.835 | 1.057 | 0.167 | 0.815 | 1995 | 1.150 | 0.709 | 0.984 | 0.376 | 0.805 |
| 1981 | 1.100 | 0.735 | 1.064 | 0.174 | 0.768 | 1996 | 1.080 | 0.773 | 0.954 | 0.400 | 0.802 |
| 1982 | 1.000 | 0.742 | 1.066 | 0.182 | 0.747 | 1997 | 1.134 | 0.777 | 0.932 | 0.421 | 0.816 |
| 1983 | 1.200 | 0.716 | 1.079 | 0.191 | 0.797 | 1998 | 1.591 | 0.726 | 0.914 | 0.448 | 0.920 |
| 1984 | 1.240 | 0.709 | 1.098 | 0.195 | 0.811 | 1999 | 1.165 | 0.781 | 0.941 | 0.471 | 0.839 |
| 1985 | 1.300 | 0.666 | 1.111 | 0.205 | 0.820 | 2000 | 1.164 | 0.783 | 0.931 | 0.477 | 0.839 |
| 1986 | 1.400 | 0.653 | 1.079 | 0.206 | 0.834 | 2001 | 1.089 | 0.829 | 0.960 | 0.485 | 0.841 |
| 1987 | 1.300 | 0.638 | 1.053 | 0.212 | 0.801 | 2002 | 1.199 | 0.861 | 0.947 | 0.495 | 0.876 |
| 1988 | 1.340 | 0.621 | 1.030 | 0.217 | 0.802 | 2003 | 1.207 | 0.910 | 0.936 | 0.507 | 0.890 |
| 1989 | 1.270 | 0.609 | 1.049 | 0.227 | 0.789 | 2004 | 0.923 | 0.936 | 0.922 | 0.524 | 0.826 |
| 1990 | 1.300 | 0.601 | 1.053 | 0.240 | 0.798 | 2005 | 1.143 | 0.944 | 0.358 | 0.547 | 0.748 |
| 1991 | 1.200 | 0.716 | 1.010 | 0.278 | 0.801 | 2006 | 0.930 | 0.996 | 0.898 | 0.576 | 0.850 |
| 1992 | 1.350 | 0.716 | 0.982 | 0.31 7 | 0.841 | 2007 | 0.919 | 1.000 | 0.887 | 0.620 | 0.857 |
| 1993 | 1.240 | 0.711 | 0.957 | 0.340 | 0.812 | 2008 | 1.025 | 1.000 | 0.912 | 0.664 | 0.900 |
| 1994 | 1.160 | 0.709 | 0.967 | 0.338 | 0.794 | – | – | – | – | – | – |

urbanization quality (Table 6.9). Air Quality Index, green coverage, sewage treatment rate, garbage disposal and solid waste recycling rate increased from 0.46, 15.7, 3, 6.8, 12 % in 1980 to 0.59, 37, 70.1, 66.7, 64.9 % in 2008. Among them, the sewage treatment rate, garbage disposal and solid waste recycling rate had increased greatly, but were still well below their ideal values.

#### 6.3.5.2 Spatial Dynamics of the Subsystems of Urbanization Quality

1. Economic efficiency. Economic efficiency shows a general decreasing spatial pattern from the eastern provinces, to the central and western provinces, though Yunnan and Xinjiang have relatively high level of economic efficiency. Economic efficiency is strongly related with the level of economic development. In general, higher level of economic development of the region often indicates a higher economic efficiency. From the temporal perspective, the provincial economic efficiency has been improved quite significantly from 1990 to 2008. In 1990, Yunnan province had the highest economic efficiency (0.73), while the second highest, Liaoning's EEI is only 0.25. As a matter of fact, among the 31 provincial units, economic efficiency indices of 28 of them were less than 0.20. By 2000, however, most provinces' economic efficiency indices were over 0.20. Yunnan's economic efficiency again was the highest (0.90). By 2008, most of the provincial economic efficiency indices were 0.50 and above (18 out of 31), while Gansu ranked the lowest with a value of 0.27.
2. Economic structure. Economic structure and efficiency are highly correlated. Regional economic structure has great influence on the level of economic efficiency. Specifically, appropriate economic structure can promote economic efficiency and vice versa. From the geographical distribution perspective, in 1990, the economic structure of Western China was significantly higher than that in Eastern and Central China. During the years from 1995 to 2008, economic structure did not exhibit any significant spatial heterogeneity among the Easter, Central and Western China. This is mainly because the economy of Eastern China in the early 1990s focused on heavy industry, while during later years of reform and opening up, such economic structure gradually evened out from the Eastern to the rest of China. From a temporal perspective, the provincial economic structure exhibit different degrees of improvement during the study period. In 1990, the overall economic efficiency indices were between 0.25 and 0.45, which increased to be between 0.30 and 0.60 in 2008. The highest economic structure index in Shanghai was 0.98.
3. Economic development cost. From a geographic distribution perspective, in 1990 except for Heilongjiang, the economic development costs of the remaining provinces were fairly high. In 2000, the economic development costs were higher in the North than the South, and higher in the West than the East. In 2008, the difference of economic development costs between the North and the South and the East and the West were still large, but decreased comparing

to 1990. From a temporal perspective, the overall economic development cost for all provincial level units decreased with various degrees, especially in the eastern provinces, the cost of economic development in 2008 mostly fell below 0.40.

4. Economic growth force. Economic growth force indices at the provincial level often had large fluctuations. This is mainly because of different technology adoption capability in different regions. In both 1990 and 2008, economic growth forces were higher in the East and South than the West and the North. In 2000, it was higher in the East and North than the West and South.
5. Human Development Index. HDI also exhibit apparent temporal and spatial heterogeneity. In general, it showed a gradient pattern from high in the Eastern Coastal regions to the Central regions, and lowest in the Western regions. In 1990, Shanghai's HDI was the highest (0.86), while the lowest was in Tibet (0.38). Beijing and Tianjin's HDIs were 0.74, and 0.79, respectively. In 2008, HDIs in most of the Eastern Coastal provinces reached over 0.80, while in the Central and Western Provinces, they remained between 0.70 and 0.80. From the temporal perspective, HDIs for all the provinces showed a general increasing trend during our study period, mostly rose from between 0.50 and 0.70 to between 0.70 and 0.80, with narrowing regional differences.
6. Social security index. By studying the covariation between social security expenditure and urbanization quality, we did find strong evidence for a positive linear relationship (i.e., higher social security expenditure doesn't necessarily guarantee higher quality of urbanization development). Instead, there is an "appropriate" standard for social security expenditure in terms of supporting higher quality of urbanization. Specifically, the level of social security expenditure will remain stable or even decline slightly once it reaches a certain. From 1990 to 2008, the share of China's social security expenditure in GDP had been less than 9 %, far below the ideal value for supporting urbanization quality as proposed in this study (25 %). This indicates that there is no need of the concerns for excessive protection. Social security at the provincial level exhibited fairly small difference among the East, Central, and West, further indicating a lack of association between social security and economic development. From 1990 to 2008, social security at the provincial level had improved with varying degrees, but in general lagged far behind the ideal values for urbanization quality.
7. Infrastructure Development Index. SDI did not show a very salient spatial pattern in 1990. In 2008, SDI was slightly higher in the East. The overall level had been improving as well. The actual SDIs for all provinces, however, are way below the ideal values for urbanization quality.
8. Urban–rural integration index. urban–rural integration index changed little during the study period and across the nation, but overall it was decreasing from year to year. From the provincial perspective, urban–rural integration was slight higher in the East than in the Central and West, which also verified the theory that with increased urbanization level, urban–rural integration will decrease first and then increase (an inverted "U" shape). Urban–rural

integration was higher in western provincial units such as Xinjiang, Inner Mongolia, and Sichuan. This is especially true in 1990. By 2008, the majority of the provincial units' urban–rural integration indices were between 0.25 and 0.45, comparing to the range from 0.40 to 0.70 in 1990, we see an increased urban and rural division.

9. Water resource security level. From a geographic perspective, from 1990 to 2008, there was very little change regarding water resource security levels among the provincial units. In general, water resource security levels were significantly higher in Southern China than the Northern China. Water resource security levels in the Northeastern China were in the middle, while Northern China and the Hexi Corridor region in the Northwestern China had the lowest water resource security levels. From the temporal perspective, the change was not significant, either. Areas with urgent water shortage problems were always in the North, including Beijing, Tianjin, Shandong, Hebei, Jiangsu, Shanghai, Shaanxi, and Gansu. In addition, in recent years, Xinjiang, Heilongjiang, and Liaoning started to exhibit different degrees of water shortage issues due to rapid urbanization.
10. Land security level (land availability). In general, when an area is having sufficient amount of land resources, relatively low level of development and utilization, it will have higher level of land security. In 2008, land security levels at the provincial level were higher in the northwest and northeast areas than in the north and southwest areas. This is especially true in the southeastern provinces like Guangdong, Fujian, Jiangsu, and the like. These regions have larger population bases, higher urbanization level, and fast urbanization rate population, which cause relative scarcity of land resources, hence low level of land security levels.
11. Energy security level. The spatial distribution of energy security levels is opposite to that of the water resource security level. It is higher in the North than the South. This is mainly because of the spatial distribution of China's primary energy sources (coal and oil). From a temporal perspective, from 1990 to 2008, such spatial distribution changed very little. Provincial units with high energy security levels include Shanxi, Inner Mongolia, Heilongjiang, Jiangxi, Shaanxi, Qinghai, Guizhou, and Xinjiang. Shanghai, Jiangsu, Zhejiang, Beijing, and Hainan had relatively low energy security levels; their energy security indices were all less than 0.20.
12. Ecological and environmental security level. The provincial ecological and environmental security levels exhibit a gradient pattern that the East is the highest and the West is the lowest with the Central in between. By 2008, the Eastern provincial units such as Shandong, Jiangsu, Guangdong, Fujian, and Shanghai had the highest ecological and environmental security levels. Their indices were mostly 0.70 or above. Among them, Jiangsu Province had the highest index of 0.86. From 1990 to 2008, there was a gradual increasing trend of ecological and environmental security level at the provincial level. This is primarily due to the fact that in recent years, the entire nation has focused on the

issues of ecological and environment protection. For the relatively more developed economies in the Eastern coastal regions, more resources and financial supports were invested in protecting the ecological system and the environments. Such investment apparently has seen significant benefits in improving ecological and environmental security levels.

### 6.3.6 *Association Among Urbanization Quality, City Size, and Urbanization Level*

#### 6.3.6.1 There Is No Direct Association Between Urban Scale (City Size) and Urbanization Quality. Large Or Mega-Cities Do Not Necessarily Have Higher Urbanization Quality

We studied the relationship between urban scale and urbanization quality using data for 1990, 1995, 2000, 2005, and 2008. Urban scale was represented by the urban population and the total acreage of city build-up areas. Simple correlation analyses between urban scale and urbanization quality reveal that the correlation coefficients between urbanization quality and urban population in 1990, 1995, 2000, 2005, and 2008 are −0.119, 0.192, 0.067, 0.331 and 0.360. The correlation coefficients between urbanization quality and city build-up area are 0.180, 0.252, 0.160, 0.393, and 0.103 for the same years. The values are relatively small, indicating a lack of association between urbanization quality and urban scale. In other words, larger scale cities do not necessarily have higher urbanization quality (Table 6.10).

#### 6.3.6.2 Population Urbanization Is Not a Proper Index for Urbanization Quality

Comparing to population urbanization, from 1990 to 2008, the urbanization quality index (UDQ) experienced less fluctuation. In 1990, Tibet had the lowest level of urbanization as calculated as the percentage of urban population in the total population (12.1 %), while Shanghai the highest (72.6 %). Urbanization quality indices of the two, however, were about the same, 0.38. In 1995, population urbanization was between 15.9 and 82.1 %, while urbanization quality indices were between

**Table 6.10** Correlation analyses between urbanization quality and urban scale from 1990 to 2008

| | UDQ | | | | |
|---|---|---|---|---|---|
| | 1990 | 1995 | 2000 | 2005 | 2008 |
| Urban population | −0.119 | 0.192 | 0.068 | 0.331 | 0.360 |
| Completed area | 0.180 | 0.252 | 0.160 | 0.393 | 0.103 |

0.38 and 0.57. In 2000, the two ranges were 19–88.5 % and 0.39–0.59. They were 22.1–91 % and 0.43–0.64 in 2005 and 22.6–88.6 % and 0.5–0.69 in 2008. This indicates that urbanization quality and population urbanization do not necessarily correlate with each other. High population urbanization does not mean high urbanization quality.

## 6.4 Ways for Improving Urbanization Quality

China's urbanization is entering a rapid development stage. We estimate that China will face with urbanization quality issues brought by such rapid development at least in the next two or three decades. Theoretically speaking, urbanization rate and urbanization quality is a pair of inherent, but "contradictory" components of urbanization. Therefore, it is critical for a healthy future sustainable urbanization to explore the rational development model of urbanization, reasonable regulation of urbanization rate, and targeted strategies to improve urbanization quality.

### *6.4.1 Safe Mode to Balancing Urbanization Rate and Quality*

The first strategy is to promote a "safe" urbanization with appropriate rate based on the coordinative and comparative results between urbanization quality and level at the provincial level. In this section, we analyze the current urbanization process with a thorough understanding of the urbanization level and quality. We also attempt to make reasonable predictions of appropriate urban population according to different urbanization quality, and use the prediction to set the appropriate level of urbanization. We specify that urbanization rate in different regions should be different. Urban development shall avoid seeking high urbanization rate and level without considering other aspects of urbanization, and shall respect the law of urbanization development. Healthy urbanization shall avoid drastic ups and downs. The rate of urbanization shall adapt to regional economic development quality, social quality and resources, and environment security.

#### 6.4.1.1 Maintain a Reasonable Urbanization Rate, and Control Too Much Land Urbanization

From 1980 to 2008, China's population urbanization level had been lagging behind GDP development, nonagriculture development, land urbanization and urbanization quality. The general trend is that such lagging is decreasing. In 1980, it lagged approximately 20 %, yet by 2008, it lagged approximately 12–14 %. The actual

population urbanization was closing to the appropriate urbanization level. Although we have argued the population urbanization does not directly link with urbanization quality, increased amount of people in the cities also means increased labor force, which will facilitate increasing economic efficiency, improving industrial structure, enhancing social security level, and promoting infrastructure and social services. Moreover, as population urbanization increases, the cost of economic development can actually start to decrease (passed the highest point on the inversed inverted U shape). The land security level for urbanization (including water resources security, construction land security, energy security, and ecological and environmental security levels) will pass the lowest point on their "U" shaped development curve and start to increase. China is currently in a rapid urbanization stage. Population urbanization increases 1.4 % annually, which is comparable to the high level of population urbanization internationally. The future task for urbanization is to maintain a stable 0.8–1.0 % annual growth rate, promote the level of population urbanization steadily, change the lagging population urbanization scenario, and reduce the lagging effects of population urbanization on economic, social, and spatial development. Per our study, we found that the land urbanization level was approximately 18.2 % over population urbanization, which indicates a serious land resource wasting scenario. From the above analyses, the strategies for current urbanization in China shall focus on promoting gradually and steadily urbanization quality, mitigating the lagging effects of population urbanization, and promoting coordinated development among urbanization quality, level, and rate.

#### 6.4.1.2 Differentiating Policies for Different Provincial Units in Terms of Population and Land Urbanization

1. Provincial population urbanization promotion policies. Provincial urbanization can be categorized into four general types by comparing population and land urbanization levels with urbanization quality, namely, the quality lagging type, basic coordinating type, level lagging type, and excessive level lagging type. For different types of urbanization, we propose different countermeasures. Table 6.11 reflects the detailed future provincial urbanization promotion policies:

   (a) For the population and quality coordinating type, the rate of urbanization can stay put without further intervention. In 2008, provincial units in which urbanization quality and population urbanization were basically coordinating include Hebei, Inner Mongolia, Liaoning, Jilin, Heilongjiang, Jiangsu, Zhejiang, Guangdong, Chongqing, and Ningxia. Because in these regions the actual levels of urbanization had little difference than the appropriate level of urbanization; urbanization quality and level were generally coordinated and stable, the best strategy for promoting urbanization is to maintain the status quo.
   (b) Regions with low land security level, and lagging urbanization quality shall adopt the measures to control the level of urbanization. Beijing, Tianjin, and

**Table 6.11** Strategic policies to promote future provincial population urbanization for different types of urbanization

| Province | 1990 actual urbanization level/% | 1990 moderate urbanization level/% | 2008 actual urbanization level/% | 2008 moderate urbanization level/% | 2008 type of urbanization | 1990–2008 growth rate of actual urbanization level/% | 1990–2008 growth rate of moderate urbanization level/% | Promoting measures for future population urbanization |
|---|---|---|---|---|---|---|---|---|
| Beijing | 68.90 | 37.82 | 84.90 | 63.58 | Lagging quality | 0.89 | 1.43 | Controlling the population urbanization level |
| Tianjin | 70.90 | 42.08 | 77.20 | 68.78 | Lagging quality | 0.35 | 1.48 | Controlling the population urbanization level |
| Hebei | 19.10 | 35.39 | 41.90 | 46.39 | Basically coordinated | 1.27 | 0.61 | Conforming the population urbanization speed |
| Shanxi | 30.10 | 39.82 | 45.10 | 53.12 | Lagging development level | 0.83 | 0.74 | Stabilizing the population urbanization speed |
| Inner Mongolia | 36.20 | 44.56 | 51.70 | 55.03 | Basically coordinated | 0.86 | 0.58 | Conforming the population urbanization speed |
| Liaoning | 49.80 | 46.76 | 60.10 | 57.10 | Basically coordinated | 0.57 | 0.57 | Conforming the population urbanization speed |
| Jilin | 46.90 | 38.67 | 53.20 | 55.70 | Basically coordinated | 0.35 | 0.95 | Conforming the population urbanization speed |
| Heilongjiang | 48.70 | 46.81 | 55.40 | 57.09 | Basically coordinated | 0.37 | 0.57 | Conforming the population urbanization speed |

(continued)

**Table 6.11** (continued)

| Province | 1990 actual urbanization level/% | 1990 moderate urbanization level/% | 2008 actual urbanization level/% | 2008 moderate urbanization level/% | 2008 type of urbanization | 1990–2008 growth rate of actual urbanization level/% | 1990–2008 growth rate of moderate urbanization level/% | Promoting measures for future population urbanization |
|---|---|---|---|---|---|---|---|---|
| Shanghai | 72.60 | 38.08 | 88.60 | 60.02 | Lagging quality | 0.89 | 1.22 | Controlling the population urbanization level |
| Jiangsu | 24.80 | 33.32 | 54.30 | 54.49 | Basically coordinated | 1.64 | 1.18 | Conforming the population urbanization speed |
| Zhejiang | 36.50 | 34.89 | 57.60 | 56.28 | Basically coordinated | 1.17 | 1.19 | Conforming the population urbanization speed |
| Anhui | 19.60 | 33.96 | 40.50 | 56.54 | Lagging development level | 1.16 | 1.25 | Stabilizing the population urbanization speed |
| Fujian | 29.30 | 39.65 | 49.90 | 56.30 | Lagging development level | 1.14 | 0.93 | Stabilizing the population urbanization speed |
| Jiangxi | 23.70 | 37.43 | 41.40 | 53.13 | Lagging development level | 1.01 | 0.87 | Stabilizing the population urbanization speed |
| Shandong | 31.10 | 37.31 | 47.60 | 55.53 | Lagging development level | 0.92 | 1.01 | Stabilizing the population urbanization speed |
| Henan | 17.80 | 35.11 | 36.00 | 49.70 | Lagging development level | 1.01 | 0.81 | Stabilizing the population urbanization speed |

(continued)

**Table 6.11** (continued)

| Province | 1990 actual urbanization level/% | 1990 moderate urbanization level/% | 2008 actual urbanization level/% | 2008 moderate urbanization level/% | 2008 type of urbanization | 1990–2008 growth rate of actual urbanization level/% | 1990–2008 growth rate of moderate urbanization level/% | Promoting measures for future population urbanization |
|---|---|---|---|---|---|---|---|---|
| Hubei | 29.40 | 36.31 | 45.20 | 55.24 | Lagging development level | 0.88 | 1.05 | Stabilizing the population urbanization speed |
| Hunan | 20.70 | 38.61 | 42.20 | 53.37 | Lagging development level | 1.19 | 0.82 | Stabilizing the population urbanization speed |
| Guangdong | 39.80 | 37.76 | 63.40 | 58.42 | Basically coordinated | 1.31 | 1.15 | Conforming the population urbanization speed |
| Guangxi | 17.80 | 41.04 | 38.20 | 52.81 | Lagging development level | 1.13 | 0.65 | Stabilizing the population urbanization speed |
| Hainan | 24.70 | 43.14 | 48.00 | 54.50 | Lagging development level | 1.29 | 0.63 | Stabilizing the population urbanization speed |
| Chongqing | 17.20 | 35.81 | 50.00 | 50.21 | Basically coordinated | 1.82 | 0.80 | Conforming the population urbanization speed |
| Sichuan | 19.50 | 33.76 | 37.40 | 50.74 | Lagging development level | 0.99 | 0.94 | Stabilizing the population urbanization speed |
| Guizhou | 21.40 | 33.88 | 29.10 | 49.60 | Lagging development level | 0.43 | 0.87 | Accelerating the population urbanization speed |

(continued)

**Table 6.11** (continued)

| Province | 1990 actual urbanization level/% | 1990 moderate urbanization level/% | 2008 actual urbanization level/% | 2008 moderate urbanization level/% | 2008 type of urbanization | 1990–2008 growth rate of actual urbanization level/% | 1990–2008 growth rate of moderate urbanization level/% | Promoting measures for future population urbanization |
|---|---|---|---|---|---|---|---|---|
| Yunnan | 17.60 | 44.32 | 33.00 | 60.16 | Lagging development level | 0.86 | 0.88 | Stabilizing the population urbanization speed |
| Tibet | 12.10 | 38.38 | 22.60 | 51.71 | Overly lagging development level | 0.58 | 0.74 | Accelerating the population urbanization speed |
| Shaanxi | 25.60 | 35.05 | 42.10 | 52.92 | Lagging development level | 0.92 | 0.99 | Stabilizing the population urbanization speed |
| Gansu | 20.70 | 31.34 | 32.20 | 52.15 | Lagging development level | 0.64 | 1.16 | Accelerating the population urbanization speed |
| Qinghai | 32.10 | 43.57 | 40.90 | 55.85 | Lagging development level | 0.49 | 0.68 | Accelerating the population urbanization speed |
| Ningxia | 29.70 | 33.43 | 45.00 | 46.14 | Basically coordinated | 0.85 | 0.71 | Conforming the population urbanization speed |
| Xinjiang | 32.80 | 45.32 | 39.60 | 54.34 | Lagging development level | 0.38 | 0.50 | Accelerating the population urbanization speed |

*Note* Hongkong, Marco, and Taiwan were not analyzed due to the lack of data

Shanghai were the three provincial units that fall under this category. From 1990 to 2008, urbanization spatial security level had been maintained between 0.20 and 0.45. Water security, land resource security, and energy security levels were all low. Their spatial urbanization was maintained mainly by "robbing" from neighboring provincial units for all types of resources. In recent years, there were a series of serious problems due to rapid urbanization in Beijing, Tianjin, and Shanghai. To address these issues and problems, the most effective approach is to control the level of urbanization, mitigate the population pressure due to rapid urbanization to prevent urbanization from being collapsed.

(c) For cities with lagging population urbanization, and the growth rate for population urbanization from 1990 to 2008 was lower than 0.8 %, the strategy should focus on promoting urbanization. If population urbanization level lags behind other aspects of urbanization and socioeconomic development, it will cause lagging effects on the entire region's development. According to Zhou Yixing and colleagues (2005) [5], if urbanization rate is over 0.8 %, that's called rapid urbanization. From our previous classification, Guizhou, Gansu, Qinghai, and Xinjiang fall within this category, hence accelerating regional population urbanization rate would be appropriate strategy to improve their urbanization quality.

(d) For regions with lagging population urbanization but rapid urbanization rate (over 0.8 %) from 1990 to 2008, the appropriate urbanization strategy is to stabilize such population urbanization. From our analysis above, Shanxi, Anhui, Fujian, Jiangxi, Shandong, Henan, Hubei, Hunan, Guangxi, Hainan, Sichuan, Yunnan, and Shaanxi fall within this category.

(e) For regions with over-lagging population urbanization level, the appropriate strategy is to accelerate population urbanization. Tibet is the only provincial level unit that fall within this category. From 1990 to 2008, Tibet had an annual urbanization rate of 0.87 %, which can be deemed high rate of urbanization. From above analysis, however, the difference between the actual urbanization level and the appropriate urbanization level in Tibet is almost 30 %. Higher rate of urbanization might still be called for in Tibet.

2. Promoting land urbanization differently in different provincial units. From analyzing the coordination between land urbanization (percentage of the amount of population who lives on urbanized land) and population urbanization (percentage of the amount of nonagricultural population), we can also categorize urbanization at the provincial level to be three types, namely, land urbanization and population urbanization are relatively balanced, land urbanization is higher than population urbanization, and land urbanization is much higher (over three times higher) than population urbanization. Table 6.12 lists in detail the different strategies that shall be adopted for different types of land and population urbanization coordination:

**Table 6.12** Different strategies to different land urbanization types

| Province | Actual urbanization level/% | Urban construction land area per capita/$m^2$ | Population urbanization level based on urban construction land area[a]/% | $L_{(t)}$ | Type of land urbanization | Countermeasures for future land urbanization |
|---|---|---|---|---|---|---|
| Beijing | 84.9 | 113.3 | 96.2 | 0.117 | Preemptive development | Controlling the land urbanization level |
| Tianjin | 77.2 | 102.9 | 79.4 | 0.028 | Basically coordinated | Conforming the land urbanization speed |
| Hebei | 41.9 | 130.4 | 54.6 | 0.233 | Preemptive development | Controlling the land urbanization level |
| Shanxi | 45.1 | 118.2 | 53.3 | 0.154 | Preemptive development | Controlling the land urbanization level |
| Inner Mongolia | 51.7 | 209.1 | 100 | 0.483 | Preemptive development | Controlling the land urbanization level |
| Liaoning | 60.1 | 123.0 | 73.9 | 0.187 | Preemptive development | Controlling the land urbanization level |
| Jilin | 53.2 | 139.1 | 74.0 | 0.281 | Preemptive development | Controlling the land urbanization level |
| Heilongjiang | 55.4 | 139.3 | 77.2 | 0.282 | Preemptive development | Controlling the land urbanization level |
| Shanghai | 88.6 | 194.0 | 100 | 0.114 | Preemptive development | Controlling the land urbanization level |
| Jiangsu | 54.3 | 145.7 | 79.1 | 0.314 | Preemptive development | Controlling the land urbanization level |
| Zhejiang | 57.6 | 152.3 | 87.7 | 0.343 | Preemptive development | Controlling the land urbanization level |
| Anhui | 40.5 | 161.7 | 65.5 | 0.382 | Preemptive development | Controlling the land urbanization level |

(continued)

**Table 6.12** (continued)

| Province | Actual urbanization level/% | Urban construction land area per capita/$m^2$ | Population urbanization level based on urban construction land area[a]/% | $L_{(t)}$ | Type of land urbanization | Countermeasures for future land urbanization |
|---|---|---|---|---|---|---|
| Fujian | 49.9 | 116.7 | 58.2 | 0.143 | Preemptive development | Controlling the land urbanization level |
| Jiangxi | 41.4 | 138.4 | 57.3 | 0.277 | Preemptive development | Controlling the land urbanization level |
| Shandong | 47.6 | 157.9 | 75.2 | 0.367 | Preemptive development | Controlling the land urbanization level |
| Henan | 36.0 | 140.1 | 50.5 | 0.287 | Preemptive development | Controlling the land urbanization level |
| Hubei | 45.2 | 146.7 | 66.3 | 0.318 | Preemptive development | Controlling the land urbanization level |
| Hunan | 42.2 | 135.3 | 57.0 | 0.260 | Preemptive development | Controlling the land urbanization level |
| Guangdong | 63.4 | 120.0 | 76.1 | 0.167 | Preemptive development | Controlling the land urbanization level |
| Guangxi | 38.2 | 118.8 | 45.3 | 0.157 | Preemptive development | Controlling the land urbanization level |
| Hainan | 48.0 | 164.6 | 79.0 | 0.392 | Preemptive development | Controlling the land urbanization level |
| Chongqing | 50.0 | 105.3 | 52.6 | 0.049 | Basically coordinated | Conforming the land urbanization speed |
| Sichuan | 37.4 | 123.6 | 46.2 | 0.190 | Preemptive development | Controlling the land urbanization level |
| Guizhou | 29.1 | 150.4 | 43.8 | 0.336 | Preemptive development | Controlling the land urbanization level |

(continued)

**Table 6.12** (continued)

| Province | Actual urbanization level/% | Urban construction land area per capita/$m^2$ | Population urbanization level based on urban construction land area[a]/% | $L_{(t)}$ | Type of land urbanization | Countermeasures for future land urbanization |
|---|---|---|---|---|---|---|
| Yunnan | 33.0 | 124.9 | 41.2 | 0.199 | Preemptive development | Controlling the land urbanization level |
| Tibet | 22.6 | 352.3 | 79.8 | 0.717 | Overly preemptive development | Strictly controlling the land urbanization level |
| Shaanxi | 42.1 | 135.5 | 57.0 | 0.261 | Preemptive development | Controlling the land urbanization level |
| Gansu | 32.2 | 155.5 | 50.0 | 0.356 | Preemptive development | Controlling the land urbanization level |
| Qinghai | 40.9 | 166.5 | 68.2 | 0.400 | Preemptive development | Controlling the land urbanization level |
| Ningxia | 45.0 | 183.8 | 82.7 | 0.456 | Preemptive development | Controlling the land urbanization level |
| Xinjiang | 39.6 | 177.9 | 70.5 | 0.438 | Preemptive development | Controlling the land urbanization level |

[a]Is the carrying urbanization level of urban construction land in that year, according to the standards of urban and rural planning which is the per capita urban construction land area is 100 $m^2$

(a) For regions with relatively balanced land and population urbanization, the strategy is to maintain the current coordination. Tianjin and Chongqing are the only two provincial units that fall within this category. In 2008, the urban land areas per capita were 102.9 and 105.3 $m^2$. Land urbanization and population urbanization could be maintained as is.
(b) For regions with higher land urbanization than population urbanization, controlling land urbanization (urban sprawl or urban land expansion) in the short term until they two are coordinated is the primary strategy. Twenty-eight provincial units, namely, Beijing, Hebei, Shanxi, Inner Mongolia, Liaoning, Jilin, Heilongjiang, Shanghai, Jiangsu, Zhejiang, Anhui, Fujian, Jiangxi, Shandong, Henan, Hubei, Hunan, Guangdong, Guangxi, Hainan, Chongqing, Sichuan, Guizhou, Yunnan, Shaanxi, Gansu, Qinghai, Ningxia, and Xinjiang fall within this category. The coordination index were between 0.1 and 0.5.
(c) For regions with much higher land urbanization than population urbanization, we need to implement strict land urbanization controlling policy to prevent land urbanization from further expansion. The only provincial unit in 2008 that fell within this category was Tibet. In 2008, Tibet's urban land area per capita reached 352.3 $m^2$, the coordination index was 0.717. Strict controlling of such blind expansion shall be implemented until land urbanization and population urbanization reach reasonable balance.

3. Comprehensive analysis of promoting provincial level urbanization. Combining the above two strategies for promoting urbanization at provincial level, we propose the comprehensive urbanization promoting strategies as shown in Table 6.13.

### 6.4.2 *Differentiating Mode to Improving Urbanization Quality Based on Local Conditions*

Based on the different spatial urbanization security levels, we propose the so-called "differentiating" population urbanization development mode. Specifically, for the central and western regions with higher spatial urbanization security levels, we shall promote relatively faster urbanization. For the eastern regions with low spatial urbanization security, urbanization needs to decelerate. For regions with extremely low spatial urbanization security and urbanization depends primarily on "robbing" other regions' resource and environment capacity, we suggest stopping the urbanization process for the time being, instead focusing on strengthening its economic and social development quality, improve the spatial input, and output efficiency. From this analysis, we suggest that during the process of urbanization, we shall attempt to find the weak link of urbanization, put efforts to reduce the impact of the "bottleneck" factors in urbanization, and implement of "targeted" urbanization boost mode.

**Table 6.13** Comprehensive analysis of China's provincial level urbanization

| | Province | Countermeasures for future population urbanization | Countermeasures for future land urbanization |
|---|---|---|---|
| Eastern Region | Beijing | Controlling the population urbanization level | Controlling the land urbanization level |
| | Tianjin | Controlling the population urbanization level | Conforming the land urbanization speed |
| | Hebei | Conforming the population urbanization speed | Controlling the land urbanization level |
| | Liaoning | Conforming the population urbanization speed | Controlling the land urbanization level |
| | Shanghai | Controlling the population urbanization level | Controlling the land urbanization level |
| | Jiangsu | Conforming the population urbanization speed | Controlling the land urbanization level |
| | Zhejiang | Conforming the population urbanization speed | Controlling the land urbanization level |
| | Fujian | Stabilizing the population urbanization speed | Controlling the land urbanization level |
| | Shandong | Stabilizing the population urbanization speed | Controlling the land urbanization level |
| | Guangdong | Conforming the population urbanization speed | Controlling the land urbanization level |
| | Guangxi | Stabilizing the population urbanization speed | Controlling the land urbanization level |
| | Hainan | Stabilizing the population urbanization speed | Controlling the land urbanization level |
| Central Region | Jilin | Conforming the population urbanization speed | Controlling the land urbanization level |
| | Heilongjiang | Conforming the population urbanization speed | Controlling the land urbanization level |
| | Shanxi | Stabilizing the population urbanization speed | Controlling the land urbanization level |
| | Inner Mongolia | Conforming the population urbanization speed | Controlling the land urbanization level |
| | Anhui | Stabilizing the population urbanization speed | Controlling the land urbanization level |
| | Jiangxi | Stabilizing the population urbanization speed | Controlling the land urbanization level |
| | Henan | Stabilizing the population urbanization speed | Controlling the land urbanization level |
| | Hubei | Stabilizing the population urbanization speed | Controlling the land urbanization level |
| | Hunan | Stabilizing the population urbanization speed | Controlling the land urbanization level |

(continued)

**Table 6.13** (continued)

| | Province | Countermeasures for future population urbanization | Countermeasures for future land urbanization |
|---|---|---|---|
| Western Region | Chongqing | Conforming the population urbanization speed | Conforming the land urbanization speed |
| | Sichuan | Stabilizing the population urbanization speed | Controlling the land urbanization level |
| | Guizhou | Accelerating the population urbanization speed | Controlling the land urbanization level |
| | Yunnan | Stabilizing the population urbanization speed | Controlling the land urbanization level |
| | Tibet | Accelerating the population urbanization speed | Strictly controlling the land urbanization level |
| | Shaanxi | Stabilizing the population urbanization speed | Controlling the land urbanization level |
| | Gansu | Accelerating the population urbanization speed | Controlling the land urbanization level |
| | Qinghai | Accelerating the population urbanization speed | Controlling the land urbanization level |
| | Ningxia | Conforming the population urbanization speed | Controlling the land urbanization level |
| | Xinjiang | Accelerating the population urbanization speed | Controlling the land urbanization level |

#### 6.4.2.1 Focuses of Promoting Urbanization Quality Subsystems Nationally

In 2008, China's economic urbanization quality, social urbanization quality and spatial (land) security urbanization indices were 0.428, 0.556, and 0.900. Economic urbanization quality was relatively low comparing to social and spatial urbanization quality, though EEI and economic structure index increased gradually. In 2008, these two indices were 0.516 and 0.492, which were far lower than the international level. In addition, the cost of China's economic development is fairly high, and the economic growth force index is still way below those of the developed nations. Energy consumption, water consumption, and solid waste discharge per 10,000 RMB Yuan were rather high, which are the important "bottleneck" factors to low economic urbanization quality. Among the indices that formed the social urbanization quality, the HDI was in the medium to high level. Social security level, on the other hand, was fairly low, and the gap between urban and rural areas was widening. Although spatial urbanization quality was at a relatively high level, resource and energy consumption, and ecological damage were high due to rapid socioeconomic development. Future focuses of promoting urbanization quality shall emphasize on stabilizing the spatial urbanization quality, improving economic efficiency, softening industrial structure (high-tech and knowledge based economy), developing water-saving and energy-saving industries, accelerating technological

innovation for high water and energy consumption industries, and reducing their proportions in the industries, thereby reducing the cost of economic development. In addition, while economic development quality is of great importance, it is equally important to maintain the stability of the current development of HDI, increase investment in social security, improve the fairness of the social security system, speed up the process of urbanization, and put efforts to narrow the gap between urban and rural areas, in order to promote social urbanization quality. During the processes of developing and utilizing resources and energy, it is crucial to also protect the environment, increase investment in ecological and environmental protection, and improve the ecological compensation mechanism.

#### 6.4.2.2 Focuses of Promoting Urbanization Quality at Different Provincial Units

From our analyses of urbanization quality at provincial level and its classification, we propose different strategies for different provincial units. In Table 6.14, we use the star symbols to identify which specific aspects of the particular provincial unit's urbanization quality requires immediate to not-so-urgent attention. Specifically, if an individual aspect requires immediate attention, we mark it with five red stars; if it requires urgent, but not immediate attention, then a four blue stars; if it is not-so-urgent, but shall be addressed in the near future, a three-star symbol is given, and so on and so forth. For each provincial unit, the detailed elaboration ensues:

1. For Beijing, promoting economic growth force and energy security level requires immediate attention. This is followed by improving water resource security level. The third priority would be to accelerate the integration of urban and rural development, and increase land resource security level.
2. For Tianjin, enhancing water resource security level is the first priority. Upgrading economic structure, improving the level of social security, reducing the gap between urban and rural development, and improving energy security level require urgent attention.
3. For Hebei Province, improving the economic growth force requires immediate attention. This is followed by the need to improve the economic structure, reduce the cost of economic development, improve the level of social security, narrow the gap between urban and rural areas, reduce water consumption, energy consumption for economic development, phase out backward and high water and energy consumption industries, and to improve the spatial urbanization security level.
4. For Shanxi Province, the first priority is to improve the economic growth force. This is followed by the need to enhance the economic structure, reduce the cost of economic development, and narrow the income gap between urban and rural areas. Shanxi Province has relative high spatial urbanization security level. In the future, we need to stabilize such spatial urbanization security level to prevent overdevelopment of resource and energy.

**Table 6.14** Development priorities of improving urbanization quality in each province

| Province | Economic efficiency | Economic structure | Economic development cost | Economic growth dynamic | Human development index | Social security | Infrastructure | Urban–rural integration | Water resources security | Construction land security | Energy security | Eco-environment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Beijing | ★★ | ★ | ★★ | ★★★★★ | ★ | ★★ | ★★ | ★★★ | ★★★★ | ★★★ | ★★★★★ | ★★ |
| Tianjin | ★ | ★★★ | ★★ | ★ | ★ | ★★★ | ★★ | ★★★ | ★★★★ | ★ | ★★★ | ★★ |
| Hebei | ★★★ | ★★★★ | ★★★★ | ★★★★★ | ★ | ★★★★ | ★★ | ★★★★ | ★★★★ | ★ | ★★★★ | ★★ |
| Shanxi | ★★★ | ★★★★ | ★★★★ | ★★★★★ | ★★ | ★★★ | ★★ | ★★★★ | ★★★ | ★ | ★ | ★★ |
| Inner Mongolia | ★★★ | ★★★★ | ★★★★★ | ★★★★ | ★ | ★★★★ | ★★ | ★★★★ | ★ | ★ | ★ | ★★★ |
| Liaoning | ★ | ★★★★ | ★★★★ | ★★★★★ | ★ | ★★★ | ★★ | ★★★★ | ★★ | ★ | ★★★★ | ★★★ |
| Jilin | ★★ | ★★★ | ★★★★ | ★★★★★ | ★ | ★★★ | ★★ | ★★★★ | ★ | ★ | ★★★ | ★★★ |
| Heilongjiang | ★★ | ★★★★ | ★★★★ | ★★★ | ★ | ★★★ | ★★★ | ★★★ | ★★★ | ★ | ★ | ★★★ |
| Shanghai | ★ | ★★ | ★★★ | ★★★★★ | ★ | ★★ | ★★ | ★★★★ | ★★★★★ | ★★ | ★★★★★ | ★★ |
| Jiangsu | ★★ | ★★★ | ★★★ | ★★★★★ | ★ | ★★★ | ★★ | ★★★★ | ★★★★ | ★ | ★★★★★ | ★ |
| Zhejiang | ★★ | ★★★ | ★★★★ | ★★★★★ | ★ | ★★★★ | ★★ | ★★★ | ★ | ★ | ★★★★★ | ★★ |
| Anhui | ★★ | ★★★★ | ★★★★ | ★★★★★ | ★★ | ★★★★ | ★★ | ★★★★ | ★ | ★ | ★ | ★★ |
| Fujian | ★★ | ★★★ | ★★★★ | ★★★★ | ★ | ★★★★ | ★★ | ★★★★ | ★ | ★★ | ★★★★ | ★★ |
| Jiangxi | ★★★★ | ★★★★ | ★★★★ | ★★★★ | ★★ | ★★★ | ★★ | ★★★★ | ★ | ★ | ★ | ★★★ |
| Shandong | ★★ | ★★★★ | ★★★ | ★★★★★ | ★ | ★★★★ | ★★ | ★★★★ | ★★★ | ★ | ★★★ | ★ |
| Henan | ★★★ | ★★★★ | ★★★★ | ★★★★★ | ★★ | ★★★★ | ★★★ | ★★★★ | ★★★ | ★ | ★ | ★★ |
| Hubei | ★★★ | ★★★ | ★★★★★ | ★★★★★ | ★★ | ★★★★ | ★★ | ★★★★ | ★ | ★ | ★★★ | ★★ |
| Hunan | ★★★ | ★★★★ | ★★★★ | ★★★ | ★★ | ★★★★ | ★★ | ★★★★ | ★ | ★ | ★★★ | ★★ |
| Guangdong | ★★ | ★★ | ★★★★ | ★★★★ | ★ | ★★★ | ★★ | ★★★★ | ★ | ★★ | ★★★★★ | ★★ |
| Guangxi | ★★★ | ★★★★ | ★★★★★ | ★ | ★★ | ★★★★ | ★★ | ★★★★ | ★ | ★ | ★★★★ | ★★ |

(continued)

**Table 6.14** (continued)

| Province | Economic efficiency | Economic structure | Economic development cost | Economic growth dynamic | Human development index | Social security | Infrastructure | Urban–rural integration | Water resources security | Construction land security | Energy security | Eco-environment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hainan | ★★★ | ★★★ | ★★★ | ★★★★★ | ★★ | ★★★ | ★★ | ★★★★ | ★ | ★ | ★★★★★ | ★★ |
| Chongqing | ★★★★ | ★★★ | ★★★★ | ★★★★★ | ★★ | ★★★★ | ★★ | ★★★★ | ★ | ★★ | ★★ | ★★ |
| Sichuan | ★★★★ | ★★★ | ★★★★ | ★★★★★ | ★★ | ★★★★ | ★★ | ★★★★ | ★ | ★★ | ★ | ★★ |
| Guizhou | ★★★★ | ★★★ | ★★★★★ | ★★★★★ | ★★ | ★★★★ | ★★★ | ★★★★ | ★ | ★ | ★ | ★★★ |
| Yunnan | ★ | ★★★★ | ★★★★★ | ★★★ | ★★ | ★★★★ | ★★ | ★★★★ | ★ | ★ | ★ | ★★ |
| Tibet | ★★★★ | ★★ | ★★★★ | ★★ | ★★ | ★★★★ | ★★ | ★★★★ | ★ | ★ | ★★★★ | ★★★★ |
| Shaanxi | ★★★ | ★★★★ | ★★★★ | ★★★★★ | ★★ | ★★★★ | ★★ | ★★★★ | ★ | ★ | ★ | ★★★ |
| Gansu | ★★★★ | ★★★★ | ★★★★★ | ★ | ★★ | ★★★ | ★★★ | ★★★★ | ★★★ | ★ | ★★ | ★★★ |
| Qinghai | ★★★ | ★★★★ | ★★★★★ | ★ | ★★ | ★★★ | ★★ | ★★★★ | ★ | ★ | ★ | ★★★ |
| Ningxia | ★★★ | ★★★★ | ★★★★★ | ★★★★★ | ★★ | ★★★★ | ★★ | ★★★★ | ★★★★★ | ★ | ★ | ★★ |
| Xinjiang | ★★★ | ★★★★ | ★★★★★ | ★★ | ★★ | ★★★ | ★★ | ★★★★ | ★★★ | ★ | ★ | ★★★ |

*Note* Five red stars (★★★★★) suggest the first priority of future urbanization quality improvement, four blue stars (★★★★) suggest the second priority of future urbanization quality improvement, and the rest can be done by this analogy

5. For Inner Mongolia, the first priority is to reduce the cost of economic development. The second priority is the need to enhance the economic structure and economic growth force, improve the level of social security, and narrow the income gap between urban and rural areas.
6. For Liaoning Province, the first priority is to improve the economic growth force. The need to enhance the economic structure, reduce the cost of economic development, and narrow the gap between urban and rural areas requires urgent attention.
7. For Jilin Province, the first priority is to improve the economic growth force. This followed by the need to enhance the economic structure, reduce the cost of economic development, narrow the gap between urban and rural development, and eliminate backward and energy-intensive industries as soon as possible. In addition, improving energy security and protecting the ecological environment also require urgent attention to improve urbanization quality in Jilin Province.
8. For Heilongjiang Province, the first priority is to reduce the cost of economic development and upgrade the economic structure. In addition, improving the level of social security, accelerating infrastructure construction, eliminating outdated water-intensive industries, and protecting the ecological environment are important to improve Heilongjiang Province's urbanization quality.
9. For Shanghai, the top priority is to improve the economic growth force and transfer high energy and water consumption industries. Additionally, it is also important to reduce the cost of economic development, narrow the income gap between urban and rural areas to improve the future urbanization quality in Shanghai.
10. For Jiangsu Province, the first priority is to improve the economic growth force and energy security level, transfer high energy and water consumption industries, raise the spatial urbanization security level, and narrow the income gap between urban and rural areas for stable social development.
11. For Zhejiang Province, the first priority is to improve the economic growth force and energy security level, transfer backward and energy-intensive industries, reduce the cost of economic development, improve the level of social security, increase the proportion of social security in GDP, and improve the unemployment insurance system.
12. For Anhui Province, the first priority is to improve the economic growth force. The second priority is the need to improve the economic structure, reduce the cost of economic development, improve the level of social security, and narrow the income gap between urban and rural areas.
13. For Fujian Province, the first priority is to improve the economic growth force, reduce the cost of economic development, improve the level of social security, increase the integration of urban and rural areas, transfer backward energy-intensive industries, and improve the spatial urbanization security level.
14. For Jiangxi Province, the first priority is to enhance the economic structure, improve economic growth force, reduce the cost of economic development, narrow the income gap between urban and rural areas, and speed up the integration of urban and rural development.

15. For Shandong Province, the first priority is to improve the economic growth force. This is followed by the need to promote economic restructuring, improve the level of social security, and accelerate the integration of urban and rural development.
16. For Henan Province, the first priority is to improve the economic growth force. The second priority is to reduce the cost of economic development, accelerate economic restructuring, improve the level of social security, and speed up the process of urbanization and rural integration.
17. For Hubei Province, the first priority is to improve the economic growth force, reduce the cost of economic development. The second is to improve the level of social security, and accelerate the process of urban and rural integration.
18. For Hunan Province, immediate attention is required to promote economic restructuring, reduce the cost of economic development, improve the level of social security, and accelerate the process of urban and rural integration.
19. For Guangdong Province, the first priority is to accelerate the transfer of energy-intensive industries, reduce energy intensity and improve energy security level. The second priority is to enhance economic growth force, reduce the cost of economic development, and accelerate the process of urban and rural integration.
20. For Guangxi Zhuang Autonomous Region, the first priority is to reduce the cost of economic development. This is followed by the need to promote the adjustment of economic structure, improve the level of social security, accelerate the process of urban and rural integration, phase out backward high energy-consuming industries, strengthen regional energy security level, and improve the spatial urbanization security level.
21. For Hainan Province, the first priority is to accelerate the transfer of energy-intensive industries, reduce energy intensity, improve energy security level, and improve economic growth force. The second priority is to accelerate the process of urban and rural integration. In addition, accelerating economic restructuring and improving economic efficiency are also important tasks for improving Hainan's urbanization quality.
22. For Chongqing City, the first priority is to improve the economic growth force. The second is to reduce the cost of economic development, increase economic efficiency, improve the level of social security, and accelerate the process of urban and rural integration.
23. For Sichuan Province, the first priority is to improve the economic growth force. The second is to reduce the cost of economic development, increase economic efficiency, improve the level of social security, and accelerate the process of urban and rural integration.
24. For Guizhou Province, the first priority is to improve the economic growth force, and reduce the cost of economic development. The second is to improve economic efficiency, improve the level of social security, and accelerate the process of urban and rural integration.
25. For Yunnan Province, the first priority is to reduce the cost of economic development. The second is to promote the adjustment of economic structure,

improve the level of social security, and accelerate the process of urban and rural integration.

26. For Tibet Autonomous Region, the top priority is to reduce the cost of economic development, increase economic efficiency, improve the level of social security, accelerate the process of urban and rural integration, reduce energy consumption for economic development, and improve energy security level and ecological and environmental protection level.
27. For Shaanxi Province, the first priority is to improve the economic growth force. The second is to speed up industrial restructuring, reduce the cost of economic development, improve the level of social security level, and accelerate the integration of urban and rural areas.
28. For Gansu Province, the first priority is to reduce the cost of economic development. The second is to improve economic efficiency, promote industrial restructuring, and accelerate the process of urban and rural integration.
29. For Qinghai Province, the first priority is to reduce the cost of economic development. This is followed by promoting industrial restructuring, and accelerating the process of urban and rural integration.
30. For Ningxia Hui Autonomous Region, the first priority is to improve the economic growth force, enhance the role of technological innovation in economic development and reduce the cost of economic development. This is followed by promoting industrial restructuring, improving the level of social security, and speed up urban–rural integration process.
31. For Xinjiang Uygur Autonomous Region, the first priority is to reduce the cost of economic development, adjust the industrial structure, and accelerate the process of urban and rural integration.

### *6.4.3 Intensive Mode to Reducing External Costs by Economic Development*

The empirical studies found that the cost of economic development is the fundamental reason for lower-quality economic development. Future economic development should focus on improving economic efficiency, accelerate the optimization and upgrading of industrial structure, change the economic growth mode from extensive into intensive, from the external reproduction mode that relies on large amount of capital and resource input to internal reproduction mode that depends more on improved technology and efficiency. It is also imperative to strictly follow the standards of environmental protection, safety, energy-saving, technology-innovation, and high quality. Urbanization will promote the new industrialization with low resources consumption, little environmental pollution, and good economic returns. Through implementing the "Intensive" urbanization quality enhancing strategies, we intend to effectively change the epitaxial growth mode, and constantly improve "intensive" urbanization quality and reproduction

levels. In so doing, we intend to shorten the stage of high resource and energy consumption, and pollution-intensive of urbanization, and achieve economic restructuring as soon as possible.

#### 6.4.3.1 Reduce the Cost of Water Consumption and Improve Water Security Level

China's rapid urbanization has led the current size of the cities to be close to or even exceed the carrying capacity of their water resources. Water resource systems have been under constant pressure. Water resources security levels in many places have been unable to meet the needs of the urban development for extended period of time, resulting in increasing constraints of water resource over urban development and improving urbanization quality. The following aspects should be strengthened for future protection of water resources. First, it is critical to strengthen the social and public awareness of water conservation, broadly advocate the "People's Republic of China Water Law" propaganda and education to raise public awareness of water conservation, to form good water conservation habits. Such awareness and good water-saving habits could effectively conserve water resources, and improve water needed for high quality of urbanization in the long run. Second, it is important to establish and improve water conservation laws and policies to further improve the urban water conservation regulations, revise and improve the existing regulations, and increase penalties for water wasting activities, strengthen law enforcement supervision and administration to provide regulatory support for "harnessing and conserving water." Third, a practical strategy is to adjust and optimize the industrial structure, gradually phase out high water consumption products, put efforts to cultivate low energy consumption, water consumption, less emission and knowledge-intensive industries. Fourth, promoting water reuse technology to improve industrial water and domestic water reuse needs to be stressed. Fifth, the government shall rationalize the price of water to marketize and commercialize water resources. Appropriate pricing based on water quality and the time of day could effectively curb unnecessary water waste, especially in large, mega, and super cities.

#### 6.4.3.2 Reduce the Cost of Land Resource Consumption and Improve Land Resources Security Level

The empirical studies found that in some areas urban construction land per capita is too high, land use per 10,000 RMB Yuan is too large, which causes serious waste of land. Based on these results, we propose the following countermeasures to reduce the consumption of land resources. First, we propose the implementation of the "strategic focus" land sue mode that integrate intensive and conservative use of urban and rural land. Urban population shall concentrate to urban communities to largely exploit potential existing urban land. Industries shall concentrate to

industrial parks with strict intensive land use standards for the industrial parks. Rural population shall concentrate to the township and small cities to combine various villages and release rural residential lands from being used as urban lands. Second, we need to optimize the allocation of land resources. From a resource management perspective, we shall focus on the macro level to optimize the allocation of land resources. In particular, we shall establish land use inventory database to understand the structure, ratio, amount, and spatial distribution of various land use types. Furthermore, we need to apply scale control and usage management standards to land use planning at county and village levels so that the objective and principles of land use are in consensus at all administrative levels. Third, we need to improve land use management system, promote the effective implementation of land use plans. The relationship between construction land use planning and land use approval shall abide by the principle that land use shall be determined by the market. In the meantime, unlike other commodity, land resources are immobile, and land resources need to be divided between public use and commercial uses, it is necessary to consider both the rational allocation of land resources and the protection of the eco-environment. In this regard, the government shall implement planned management. The current status quo, however, is that the construction department, land use department, and even transportation, water management, agriculture, and forestry departments all have their own land use plans. Not surprisingly, all these different plans are often conflicting with one another. It is hence beneficial to consider incorporate all these plans from various departments to a master plan to avoid repetitive approval and law enforcement [8].

#### 6.4.3.3 Reduce the Energy Consumption and Improve Energy Security Level

Energy security is the foundation of economic and social development. China has considerable variety and amount of energy resources. China's proven recoverable reserves of energy resources accounts for about 11 % of the gross amount of the world, ranked the third. Water resources reserve ranks the first in the world. From the total amount perspective, China is one of the world's richest nations in energy and water resources. At the per capita level, however, due to the large population base, the per capita energy resource is equivalent to 51 % of the world average. Moreover, energy resources in China have rather backward structure and are unevenly distributed. With the acceleration of urbanization, the future energy demand will grow rapidly, which will lead to increased pressure between the supply and demand. To mitigate this problem, we propose first to gradually phase out outdated energy-intensive industries, change economic development mode, improve energy efficiency, and reduce energy consumption. The future urbanization and industrialization shall focus more on high-tech, low-resource-consumption industries to reduce the cost of economic development, and to develop a variety of different energy consumption standards based on local energy conditions so that

regions with high reserve of energy resources can develop relatively high energy consumption industries while regions with low reserves of energy resources can also guarantee its own urbanization development. Second, we need to accelerate the energy transporting channels construction, establish energy transmission network, and accelerate the development of railways, water and land, as well as the construction of pipelines to achieve domestic energy supply and demand balance. Third, we need to improve the general public's energy-saving and environmental awareness, make full use of modern information and network technologies to accelerate the establishment of energy-saving information exchange platform. Government agencies and units should lead the movement of environmental protection and conservation; hence raise awareness of energy conservation and environmental protection of all citizens.

#### 6.4.3.4 Reduce the Cost of Environmental Damage and Improve the Ecological Environment Carrying Capacity

The environmental factors in urbanization include aspects of the atmospheric environment, water environment, and land environment. China's current environmental costs are mainly from industrial pollution. Apparently, implementing energy strategies that focus on efficiency and energy structure optimization, industrial structure adjustment, and optimization is the most fundamental approach to reduce pollution and protect the ecological environment. Combining the above-mentioned countermeasures for China's future energy development, the national government shall both apply the market mechanism by using price levers and develop appropriate laws, regulations, supplemented with certain administrative measures to promote the strategic upgrading of industrial structure and consumption structure. After all, improving economic productivity and optimizing energy consumption structure will not only have direct impact on the security of energy supply, improvement of economic efficiency and fundamental change in the mode of economic growth, but also is the fundamental way to protect the ecological environment and reduce pollution.

### *6.4.4 Fair Mode Stressing Integrated Urban and Rural Development*

"Fairness" in urbanization mainly includes social justice, social service facilities fairness, infrastructure fairness, and the degree of urban and rural integration. The dynamic imbalance during urbanization has brought a series of social contradictions and conflicts. Results from our previous analyses indicate that overall the social security level, social service facility development level and the urban and rural integration level during China's urbanization are fairly low.

#### 6.4.4.1 Strengthen Social Security Fairness and Improve the Social Security System

Social Security is a strategic social policy that the government employ to solve the survival crisis for socially vulnerable groups. In addition, social security is also a fundamental citizen right when the society develops to a certain stage. Social security plays an extremely important role on economic development and social stability. However, the issues exposed during the implementation of social security system in China have become a major problem that China and its provincial units must face during urbanization [14]. Per our calculation, most of the social security indices at the provincial level in China were between 0.2 and 0.4 in 2008, lagging far behind the level of urbanization quality index. This is also the main reason for a low social urbanization quality level. The primary issue is that the old social security system no longer works and will not meet the demands of the market and further economic development. As of now, China's national productivity level is still not high, and its economic strength is not strong enough. Some enterprises cannot even afford to pay off their existing pension. To solve these problems, the current primary focuses should be on improving the pension insurance, unemployment insurance, and medical insurance, in order to stimulate the development of other security systems. In addition, the government shall gradually release the social security system from "government-control" to "market-oriented," shifting the existing social security capital investment to the market with strong monitoring and policy interference to ensure its long term value.

#### 6.4.4.2 Promote Infrastructure Fairness and Improve the Basic Level of Infrastructure Development

The infrastructure referred herein includes public service facilities that ensure the social and economic activities, improve the living environment, overcome natural obstacles, and share resources. It is the fundamental component of urban and regional system. Specifically, it generally includes economic infrastructure such as transportation, energy, post and telecommunications, and social infrastructure including education, scientific research, health and others. For a very long time, the main urban infrastructure facilities of transportation, energy, water supply, sewerage, education, health, and others are paid by the state finance. Farmers, who also paid national taxes, do not have the privilege to enjoy or do not enjoy fully its benefits due to the urban rural division and household registration system. Rural infrastructure receives very little State investment except for the ones that are directly associated with agriculture. They were largely invested by farmers or through rural self-accumulation. Insufficient investment in rural infrastructure leads to a large infrastructure gap between the urban and rural regions. Though there are no empirical studies that have determined the exact relationship between

infrastructure and development, existing research shows that infrastructure capacity is growing in tandem with economic outputs. The low level of rural infrastructure severely restricts the development of rural areas. Increasing investment in rural infrastructure [15], strengthening infrastructure fairness, and improving the overall levels of infrastructure development are of increasing importance for the implementation of New Urbanization strategies in China.

#### 6.4.4.3 Reduce the Income Gap Between Urban and Accelerate the Process of Urban and Rural Integration

The "dual-development" structure between urban and rural development in China has become the fundamental reason for low quality of social urbanization. In view of the uneven economic and social development and big gaps between urban and rural areas in current China, this research proposes three primary approaches to accelerate the integration of urban and rural regions. The first approach is to accelerate the integration via population urbanization. Based on the different spatial urbanization security levels, we could purposefully transfer rural surplus population to small towns or cities. In so doing, we will be able to centralize the dispersed rural areas, expand urban scale, and increase the number of cities and towns, which will improve both the level or urbanization and farmer's quality of living due to more reasonable and efficient labor force allocation. The second approach is an industrialization path. The primary task is to actively explore various paths of rural industrialization (without endangering the environment) to create endogenous momentum for rural development. In so doing, farmers will have multiple sources of income other than agriculture. The purpose is to enable the rural regions to be self-reliant and self-developing. The third approach is an institutional innovation path. Institutional factors are important reasons affecting the integration of urban and rural regions in current China (the most obvious and often cited one is the legacy household registration system). Through institutional innovation, we shall be able to unfetter various obstacles preventing urban and rural integration, create a healthy environment for the integration, and provide an institutional security for the smooth realization of the urban–rural integration.

### *6.4.5 Multidimensional Evaluating Mode to Focusing on Quality Instead of Quantity*

Population urbanization was often used to represent urbanization level. The measure itself, however, only indicates the process of the quantitative side of rural residents concentrate to urban areas. The measure alone is very difficult to accurately reflect the richness of urbanization. Most provincial units in China have

proposed to greatly develop urbanization. Their target measures, however, only refer to the population urbanization level and often are raised to unrealistic or unreasonable levels. Some of those in power often treat urbanization as their image and vanity projects without really understanding that urbanization is a holistic process that involves not only population urbanization (the quantities), but also economic quality, social quality, and spatial quality of the entire city. Such mindsets often lead to an unhealthy mode of promoting urbanization that emphasizes only on quantity (the percentage), but ignores quality (the holistic, more sophisticate measure as proposed in this study). To solve these problems, in future practices, the government should dilute the importance of using a single population indicator to measure the level of urbanization. Instead, incorporating multiple dimension goals including the GDP growth, social harmony promotion, resources, and ecological environment protection into the evaluation of leading governmental officials shall be emphasized and reinforced. Specifically, the evaluation system will focus on multiple achievements such as population, resources, social security, energy saving, and pollution reduction, and environmental protection. For evaluation of the achievements in urbanization, the assessment will not only focus on urbanization rate, but also the way of urbanization and its quality, to eventually implemented the so-called "multi-dimensional" assessment mode.

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